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FOREX

STUDY BOOK FOR SUCCESSFUL FOREIGN EXCHANGE DEALING

Los Angeles, California
2001

Contents

1.Common knowledge about the trading on Forex

1.1. Forex as a aart af the global financial market

Brief data about the Forex rise and development.
The factors caused Foreign Exchange Volume Growth on Forex (Exchange Rate Volatility, Business Internationalization, Increasing of Traders' Sophistication, Developments in Telecommunications, Computer And Programming Development).
The role of the U.S. Federal Reserve System and central banks of other G-7 countries on Forex.

1.2. Risks by the trading on Forex

1.3. Forex sectors

Spot Market
Forward Market
Futures Market
Currency Options

2. Major currencies and trade systems

2.1. Major currencies

The U.S. Dollar
The Euro
The Japanese Yen
The British Pound
The Swiss Franc

2.2. Trade systems on Forex

Trading with brokers
Direct dealing

3. Fundamental analysis by trading on Forex

3.1 Theories of exchange rate determination

Purchasing Power Parity
Theory of Elasticities
Modern monetary theories on exchange rate volatility

3.2. Indicators for the fundamental analysis

Economic indicators

The Gross National Product
The Gross Domestic Product
Consumption Spending
Investment Spending
Government Spending
Net Trading

Industrial sector indicators

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Industrial Production
Capacity Utilization
Factory Orders
Durable Goods Orders
Business Inventories
Construction Data
Inflation Indicators
Producer Price Index
Consumer Price Index
Gross National Product Implicit Deflator
Gross Domestic Product Implicit Deflator
Commodity Research Bureau's Futures Index
The Journal of Commerce Industrial Price
Balance of Payments
Merchandise Trade Balance
The U.S. – Japan Merchandise Trade Balance
Employment Indicators
Employment Cost Index
Consumer Spending Indicators
Retail Sales
Consumer Sentiment
Auto Sales
Leading Indicators
Personal Income
3.3. Forex dependence on financial and sociopolitical factors
The Role of Financial Factors
Political Crises Influence
4. Technical analysis
4.1. The destination and fundamentals of technical analysis
Theory of Dow
Percent measures of prices reverse
4.2. Charts for the technical analysis
Kinds of prices and time units
Kinds of charts
Line Chart
Bar Chart
Candlestick Chart
4.3. Trends, Support and Resistance lines
Trend Line and Trade Channel
Lines of Support and Resistance
4.4. Trend Reversal patterns

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Head-and-Shoulders
Inverted Head-and-Shoulders
Double Top
Double Bottom
Triple Top
Triple Bottom
Round Top, Round Bottom, Saucer, Inverted Saucer

4.5. Trend Continuation patterns

Flags
Pennants
Triangles
Wedges
Rectangles

4.6. Gaps

Common Gaps
Breakaway Gaps
Runaway Gaps
Exhaustion Gaps

4.7. Mathematical trading methods (Technical indicators)

Moving Averages
Envelops
Ballinger Bands
Average True Range
Median Price

Oscillators

Commodity Channel Index
Directional Movement Index
Stochastics
Moving Average Convergence-Divergence (MACD)
Momentum
The Relative Strength Index (RSI)
Rate of Change (ROC)
Larry Williams's %R

Indicators combination
Ichimoku Indicator

5. Fibonacci constants and Elliott waves theory

5.1. Fibonacci constants

5.2. Elliott wave theory

References

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1. Common knowledge about the trading on Forex

1.1. Foreign exchange as a part of the world financial market

Forex – What is it? The international currency market Forex is a special kind of the world financial market. Trader's purpose on the Forex to get profit as the result of foreign currencies purchase and sale. The exchange rates of all currencies being in the market turnover are permanently changing under the action of the demand and supply alteration. The latter is a strong subject to the influence of any important for the human society event in the sphere of economy, politics and nature. Consequently current prices of foreign currencies evaluated for instance in the US dollars fluctuate towards its higher and lower meanings. Using these fluctuations in accordance with a known principle "buy cheaper – sell higher" traders obtain gains. Forex is different in compare to all other sectors of the world financial system thanks to his heightened sensibility to a large and continuously changing number of factors, accessibility to all individual and corporative traders, exclusively high trade turnover which creates an ensured liquidity of traded currencies and the round - the clock business hours which enable traders to deal after normal hours or during national holidays in their country finding markets abroad open.

Just as on any other market the trading on Forex, along with an exclusively high potential profitability, is essentially risk - bearing one. It is possible to gain a success on it only after a certain training including a familiarization with the structure and kinds of Forex, the principles of currencies price formation, the factors affecting prices alterations and trading risks levels, sources of the information necessary to account all those factors, techniques of the analysis and prediction of the market movements as well as with the trading tools and rules. An important role in the process of the preparation for the trading on Forex belongs to the demo-trading (that is to trade using a demo-account with some virtual money), which allows to testify all the theoretical knowledge and to obtain a required minimum of the trade experience not being subjected to a material damage.

Short data about the origin and development of the currency exchange market. Currency trading has a long history and can be traced back to the ancient Middle East and Middle Ages when foreign exchange started to take shape after the international merchant bankers devised bills of exchange, which were transferable third-party payments that allowed flexibility and growth in foreign exchange dealings.

The modern foreign exchange market characterized by periods of high volatility (that is a frequency and an amplitude of a price alteration) and relative stability formed itself in the twentieth century. By the mid-1930s the British capital London became to be the leading center for foreign exchange and the British pound served as the currency to trade and to keep as a reserve currency. Because in the old times foreign exchange was traded on the telex machines, or cable, the pound has generally the nickname "cable". After the World War II, where the British economy was destroyed and the United States was the only country unscarred by war, U.S. dollar, in accordance with the Breton Woods Accord between the USA, Great Britain and France (1944) became the reserve currency for all the capitalist countries and all currencies were pegged to the American dollar (through the constitution of currencies ranges maintained by central banks of relevant countries by means of the interventions or currency purchases). In turn, the U.S. dollar was pegged to gold at $35 per ounce. Thus, the U.S. dollar became the world's reserve currency. In accordance with the same agreement was organized the International Monetary Fund (IMF) rendering now a significant financial support to the developing and former socialist countries effecting economical transformation. To execute these goals the IMF uses such instruments as *Reserve trenches, which* allows a member to draw on its own reserve asset quota at the time of payment, *Credit trenches drawings* and *stand-by arrangements.* The letters are the standard form of IMF loans unlike of those as the *compensatory financing facility* extends

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financial help to countries with temporary problems generated by reductions in export revenues, the *buffer stock financing facility* which is geared toward assisting the stocking up on primary commodities in order to ensure price stability in a specific commodity and the *extended facility* designed to assist members with financial problems in amounts or for periods exceeding the scope of the other facilities.

At the end of the 70-s the free-floating of currencies was officially mandated that became the most important landmark in the history of financial markets in the XX century lead to the formation of Forex in the contemporary understanding. That is the currency may be traded by anybody and its value is a function of the current supply and demand forces in the market, and there are no specific intervention points that have to be observed. Foreign exchange has experienced spectacular growth in volume ever since currencies were allowed to float freely against each other. While the daily turnover in 1977 was U.S. $5 billion, it increased to U.S. $600 billion in 1987, reached the U.S. $1 trillion mark in September 1992, and stabilized at around $1.5 trillion by the year 2000. Main factors influences on this spectacular growth in volume are mentioned below. A significant role belonged to the increased volatility of currencies rates, growing mutual influence of different economies on bank-rates established by central banks, which affect essentially currencies exchange rates, more intense competition on goods markets and, at the same time, amalgamation of the corporations of different countries, technological revolution in the sphere of the currencies trading. The latter exposed in the development of automated dealing systems and the transition to the currency trading by means of the Internet. In addition to the dealing systems, matching systems simultaneously connect all traders around the world, electronically duplicating the brokers' market. Advances in technology, computer software, and telecommunications and increased experience have increased the level of traders' sophistication, their ability to both generate profits and properly handle the exchange risks. Therefore, trading sophistication led toward volume increase.

Regional reserve countries. Along with the global reserve currency – U.S. dollar, there are also other regional and international reserve countries.

In 1978, the nine members of the European Community ratified a plan for the creation of the European Monetary System managed by the European Fund of the Monetary Cooperation. By 1999 these countries, which constituted so-called Euro zone, have implemented the transition to the common European currency - the euro (see Figure 1.1).

The euro bills are issued in denominations of 5, 10, 20, 50, 100, 200, and 500 euros. Coins are issued in denominations of 1 and 2 euros, and 50, 20,10, 5, 2, and 1 cent.

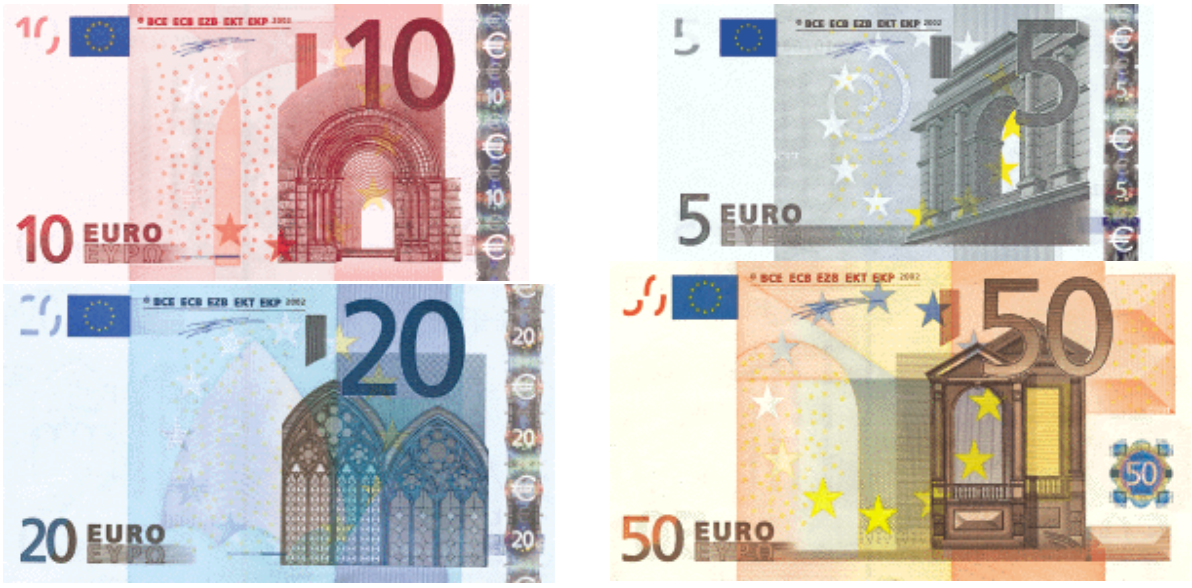

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Figure 1.1. The Euro notes.

The euro is a regional reserve currency for the euro zone countries and the Japanese yen – for the countries of South – East Asia. The portfolio of reserve currencies may change depending on specific international conditions, to include the Swiss franc.

The role of U.S. Federal Reserve System and Central banks of other G-7 countries on Forex. All central banks, and the U.S. Federal Reserve System (FRS) as well, affect the foreign exchange markets changing discount rates and performing the monetary operations (as interventions and currency purchases).

For the foreign exchange operations most significant are *repurchase agreements* to sell the same security back at the same price at a predetermined date in the future (usually within *15* days), and at a specific rate of interest. This arrangement amounts to a temporary injection of reserves into the banking system. The impact on the foreign exchange market is that the national currency *should* weaken. The repurchase agreements may be either customer repos or system repos.

Matched sale-purchase agreements are just the opposite of repurchase agreements. When executing a matched sale-purchase agreement, a bank or the FRS sells a security for immediate delivery to a dealer or a foreign central bank, with the agreement to buy back the same security at the same price at a predetermined time in the future (generally within 7 days). This arrangement amounts to a temporary drain of reserves. The impact on the foreign exchange market is that the national currency *should* strengthen.

Monetary operations include payments among central banks or to international agencies. In addition, the FRS has entered a series of currency swap arrangements with other central banks since 1962. For instance, to help the allied war effort against Iraq's invasion of Kuwait in 1990-1991, payments were executed by the Bundesbank and Bank of Japan to the Federal Reserve. Also, payments to the World Bank or the United Nations are executed through central banks.

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Intervention in the United States foreign exchange markets by the U.S. Treasury and the FRS is geared toward restoring orderly conditions in the market or influencing the exchange rates. It is not geared toward affecting the reserves.

There are two types of foreign exchange interventions: naked intervention and sterilized intervention.

Naked intervention, or ***unsterilized intervention,*** refers to the sole foreign exchange activity. All that takes place is the intervention itself, in which the Federal Reserve either buys or sells U.S. dollars against a foreign currency. In addition to the impact on the foreign exchange market, there is also a monetary effect on the money supply. If the money supply is impacted, then consequent adjustments must be made in interest rates, in prices, and at all levels of the economy. Therefore, a naked foreign exchange intervention has a long-term effect.

Sterilized intervention neutralizes its impact on the money supply. As there are rather few central banks that want the impact of their intervention in the foreign exchange markets to affect all corners of their economy, sterilized interventions have been the tool of choice. This holds true for the FRS as well. The sterilized intervention involves an additional step to the original currency transaction. This step consists of a sale of government securities that offsets the reserve addition that occurs due to the intervention. It may be easier to visualize it if you think that the central bank will finance the sale of a currency through the sale of a number of government securities. Because a sterilized intervention only generates an impact on the supply and demand of a certain currency, its impact will tend to have a short-to medium-term effect.

1.2. Risks by the foreign exchange on Forex

As it was mentioned above the trading on the Forex is essentially risk-bearing. By the evaluation of the grade of a possible risk accounted should be the following kinds of it: exchange rate risk, interest rate risk, and credit risk, country risk.

Exchange rate risk. Exchange rate risk is the effect of the continuous shift in the worldwide market supply and demand balance on an outstanding foreign exchange position. For the period it is outstanding, the position will be subject to all the price changes.

The most popular measures to cut losses short and ride profitable positions that losses should be kept within manageable limits are the *position limit* and the *loss limit.* By the position limitation a maximum amount of a certain currency a trader is allowed to carry at any single time during the regular trading hours is to be established. The *loss limit* is a measure designed to avoid unsustainable losses made by traders by means of *stop-loss* levels setting.

Interest rate risk. Interest rate risk refers to the profit and loss generated by fluctuations in the forward spreads, along with forward amount mismatches and maturity gaps among transactions in the foreign exchange book. This risk is pertinent to currency swaps, forward outright, futures, and options (See below). To minimize interest rate risk, one sets limits on the total size of mismatches. A common approach is to separate the mismatches, based on their maturity dates, into up to six months and past six months. All the transactions are entered in computerized systems in order to calculate the positions for all the dates of the delivery, gains and losses. Continuous analysis of the interest rate environment is necessary to forecast any changes that may impact on the outstanding gaps.

Credit risk. Credit risk refers to the possibility that an outstanding currency position may not be repaid as agreed, due to a voluntary or involuntary action by a counter party. In these cases, trading occurs on regulated exchanges, such as the clearinghouse of Chicago. The following forms of credit risk are known:

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1. ***Replacement risk*** occurs when counterparties of the failed bank find their books are subjected to the danger not to get refunds from the bank, where appropriate accounts became unbalanced.

2. ***Settlement risk*** occurs because of the time zones on different continents. Consequently, currencies may be traded at the different price at different times during the trading day. Australian and New Zealand dollars are credited first, then Japanese yen, followed by the European currencies and ending with the U.S. dollar. Therefore, payment may be made to a party that will declare insolvency (or be declared insolvent) immediately after, but prior to executing its own payments.

Therefore in assessing the credit risk, end users must consider not only the market value of their currency portfolios, but also the potential exposure of these portfolios. The potential exposure may be determined through probability analysis over the time to maturity of the outstanding position. The computerized systems currently available are very useful in implementing credit risk policies. Credit lines are easily monitored. In addition, the matching systems introduced in foreign exchange since April 1993 are used by traders for credit policy implementation as well. Traders input the total line of credit for a specific counterparty. During the trading session, the line of credit is automatically adjusted. If the line is fully used, the system will prevent the trader from further dealing with that counterparty. After maturity, the credit line reverts to its original level.

Dictatorship risk. Dictatorship (sovereign) risk refers to the government's interference in the Forex activity. Although theoretically present in all foreign exchange instruments, currency futures are, for all practical purposes, excepted from country risk, because the major currency futures markets are located in the USA. Hence, traders have to realize that kind of the risk and be in state to account possible administrative restrictions.

1.3. Kinds of the Forex

Spot Market. Currency spot trading is the most popular foreign currency instrument around the world, making up 37 percent of the total activity (See Figure 3.1). The features of the fast-paced spot market are high volatility and quick profits (as well losses).

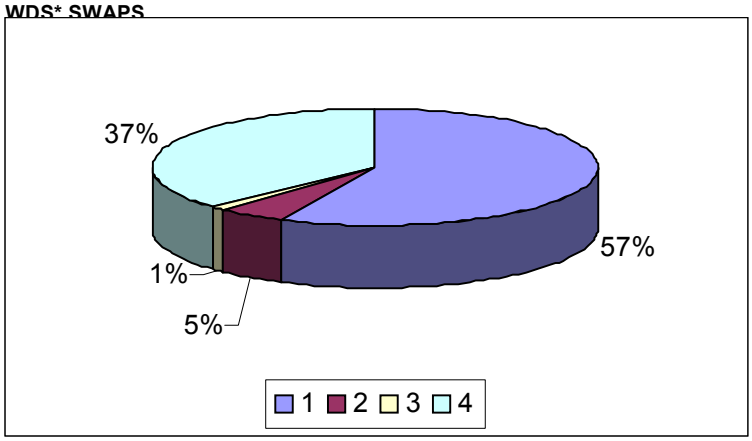

Figure 1.2. Market share of US spot trading (in %% of the volume): 1 – forwards and swaps; 2 – options; 3 - futures; 4 – spots.

A spot deal consists of a bilateral contract whereby a party delivers a specified amount of a given currency against receipt of a specified amount of another currency from a counterparty, based on an agreed

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exchange rate, within two business days of the deal date. The exception is the Canadian dollar, in which the spot delivery is executed next business day. The two-day spot delivery for currencies was developed long before technological breakthroughs in information processing. This time period was necessary to check out all transactions' details among counterparties. Although technologically feasible, the contemporary markets did not find it necessary to reduce the time to make payments. Human errors still occur and they need to be fixed before delivery.

By the entering into a contract on the spot market a bank serving a trader tells the latter the *quota* – an evaluation of the currency traded against the U.S. dollar or an other currency. A quota consists from two figures (for example, USD/JPY = 133.27/133.32 or, which is the same, USD/JPY = 133.27/32). The first from these figures (the left part) is called the *bid* – price (that is a price at which the trader sells), the second (the right part) is called the *ask* - price (the price at which the trader buys the currency). The difference between *asks* and *bid* is called the *spread*. The spread, as any currency price alteration, is being measured in *points* (*pips*).

In terms of volume, currencies around the world are traded mostly against the U.S. dollar, because the U.S. dollar is the currency of reference. The other major currencies are the euro, followed by the Japanese yen, the British pound, and the Swiss franc. Other currencies with significant spot market shares are the Canadian dollar and the Australian dollar. In addition, a significant share of trading takes place in the currencies crosses, a non-dollar instrument whereby foreign currencies are quoted against other foreign currencies, such as euro against Japanese yen.

The spot market is characterized by high *liquidity* and high *volatility*. Volatility is the degree to which the price of currency tends to fluctuate within a certain period of time. For instance, in an active global trading day (24 hours), the euro/dollar exchange rate may change its value 18,000 times "flying" 100-200 pips in a matter of seconds if the market gets wind of a significant event. On the other hand, the exchange rate may remain quite static for extended periods of time, even in excess of an hour, when one market is almost finished trading and waiting for the next market to take over. For example, there is a technical trading gap between around 4:30 PM and 6 PM EDT. In the New York market, the majority of transactions occur between 8 AM and 12 PM, when the New York and European markets overlap. The activity drops sharply in the afternoon, over 50 percent in fact, when New York loses the international trading support. (See Figure 1.3) Overnight trading is limited, as very few banks have overnight desks. Most of the banks send their overnight orders to branches or other banks that operate in the active time zones.

The reasons of the spot-market popularity, in addition to the fast liquidity-taking place thanks to the volatility, belongs also the short time of a contract execution. Therefore the credit risk is on that market restricted. The profit and loss can be either *realized* or *unrealized.* The realized P&L is a certain amount of money netted when a position is closed. The unrealized P&L consists of an uncertain amount of money that an outstanding position would roughly generate if it were closed at the current rate. The unrealized P&L changes continuously in tandem with the exchange rate.

Forward Market. On the forward Forex are used two tools: *forward outright deals* and exchange deals or *swaps. A* swap deal is a combination of a spot deal and a forward outright deal.

According to figures published by the Bank for the International Settlements, the percentage share of the forward market was 57 percent in 1998. (See Figure 1.2). Translated into U.S. dollars, out of an estimated daily gross turnover of US$1.49 trillion, the total forward market represents US$900 billion. In the forward market there is no norm with regard to the settlement dates, which range from 3 days to 3 years. Volume in currency swaps longer than one year tends to be light but, technically, there is no

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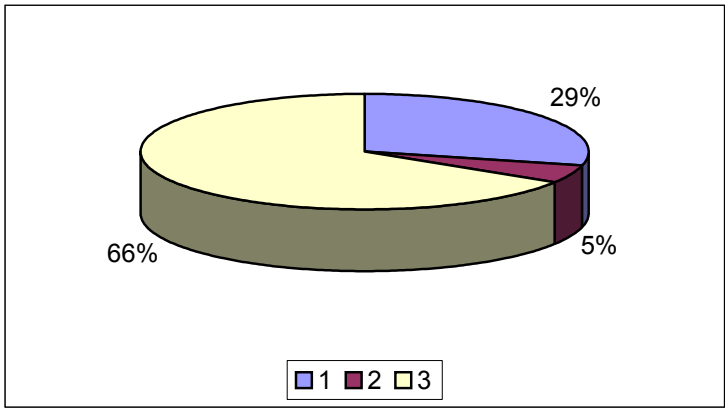

Figure 1.3. Diagram of the trade activity (in %% of the volume) of US Forex in time distribution: 1 – from 12 pm till 4 pm, 2 – from 4 pm till 8 pm, 3 – from 8 am till 12 pm.

impediment to making these deals. Any date past the spot date and within the above range may be a forward settlement, provided that it is a valid business day for both currencies. The forward markets are decentralized markets, with players around the world entering into a variety of deals either on a one-on-one basis or through brokers.

The forward price consists of two significant parts: the spot exchange rate and the forward spread. The spot rate is the main building block. The forward spread is also known as the f*orward points* or the *forward pips*. The forward spread is necessary for adjusting the spot rate for specific settlement dates different from the spot date. It holds, then, that the maturity date is another determining factor of the forward price.

Futures Market. Currency futures are specific types of forward outright deals. Because they are derived from the spot price, they are derivative instruments. (See Figure 1.2). They are specific with regard to the expiration date and the size of the trade amount. Whereas, generally, forward outright deals—those that mature past the spot delivery date—will mature on any valid date in the two countries whose currencies are being traded, standardized amounts of foreign currency futures mature only on the third Wednesday of March, June, September, and December.

The following characteristics of currency futures that make them attractive. They are open to all market participants, individuals included. It is a central market, just as efficient as the cash market, and whereas the cash market is a very decentralized market, futures trading takes place under one roof. It eliminates the credit risk because the Chicago Mercantile Exchange Clearinghouse acts as the buyer for every seller, and vice versa. In turn, the Clearinghouse minimizes its own exposure by requiring traders who maintain a nonprofitable position to post margins equal in size to their losses. Although the futures and spot markets trade closely together, certain divergences between the two occur, generating arbitraging opportunities. Gaps, volume, and open interest are significant technical analysis tools (See Chapter 4) solely available in the futures market.

Because of these benefits, currency futures trading volume has steadily attracted a large variety of players.

Because futures are forward outright contracts and the forward prices are generally slow movers, the elimination of the forward spreads will transform the futures contracts into spot contracts.

For traders outside the exchange, the prices are available from on-line monitors. The most popular pages are found on *Bridge*, *Telerate*, *Reuters*, and *Bloomberg*. Telerate presents the currency futures on

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composite pages, while *Reuters* and *Bloomberg* display currency futures on individual pages shows the convergence between the futures and spot prices.

Options Market. A currency option is a contract between a buyer and a seller that gives the buyer the right, but not the obligation, to trade a specific amount of currency at a predetermined price and within a predetermined period of time, regardless of the market price of the currency; and gives the seller, or *writer,* the obligation to deliver the currency under the predetermined terms, if and when the buyer wants to exercise the option.

More factors affect the option price relative to the prices of other foreign currency instruments. Unlike spot or forwards, both high and low volatility may generate a profit in the options market. For some, options are a cheaper vehicle for currency trading. For others, options mean added security and exact stop-loss order execution. Currency options constitute the fastest-growing segment of the foreign exchange market. As of April 1998, options represented 5 percent of the foreign exchange market. (See Figure 1.4). The biggest options trading center is the United States, followed by the United Kingdom and Japan. Options prices are based on, or derived from, the cash instruments. Often, however, traders have misconceptions regarding both the difficulty and simplicity of using options. There are also misconceptions regarding the capabilities of options.

Trading an option on currency futures will entitle the buyer to the right, but not the obligation, to take physical possession of the currency future. Unlike the currency futures, buying currency options does not require an initiation margin. The option premium, or price, paid by the buyer to the seller, or writer, reflects the buyer's total risk.

However, upon taking physical possession of the currency future by exercising the option, a trader will have to deposit a margin.

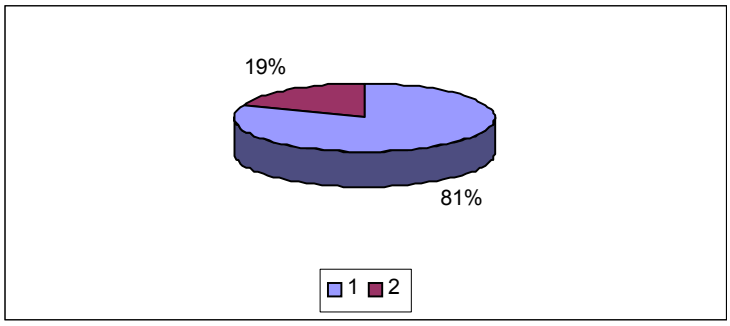

Figure 1.4. Market share of the currency options (in %% of the volume): 1 - *OTC*; 2 – organized exchanges.

The currency price is the central building block, as all the other factors are compared and analyzed against it. It is the currency price behavior that both generate the need for options and impacts on the profitability of options.

2. Kinds of major currencies and exchange systems

2.1. Major currencies

The U.S. Dollar. The United States dollar is the world's main currency – an universal measure to evaluate any other currency traded on Forex. All currencies are generally quoted in U.S. dollar terms. Under conditions of international economic and political unrest, the U.S. dollar is the main safe-haven currency, which was proven particularly well during the Southeast Asian crisis of 1997-1998.

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As it was indicated, the U.S. dollar became the leading currency toward the end of the Second World War along the Breton Woods Accord, as the other currencies were virtually pegged against it. The introduction of the euro in 1999 reduced the dollar's importance only marginally.

The other major currencies traded against the U.S. dollar are the euro, Japanese yen, British pound, and Swiss franc.

The Euro. The euro was designed to become the premier currency in trading by simply being quoted in American terms. Like the U.S. dollar, the euro has a strong international presence stemming from members of the European Monetary Union. The currency remains plagued by unequal growth, high unemployment, and government resistance to structural changes. The pair was also weighed in 1999 and 2000 by outflows from foreign investors, particularly Japanese, who were forced to liquidate their losing investments in euro-denominated assets. Moreover, European money managers rebalanced their portfolios and reduced their euro exposure as their needs for hedging currency risk in Europe declined.

The Japanese Yen. The Japanese yen is the third most traded currency in the world; it has a much smaller international presence than the U.S. dollar or the euro. The yen is very liquid around the world, practically around the clock. The natural demand to trade the yen concentrated mostly among the Japanese *keiretsu,* the economic and financial conglomerates. The yen is much more sensitive to the fortunes of the Nikkei index, the Japanese stock market, and the real estate market.

The British Pound. Until the end of World War II, the pound was the currency of reference. The currency is heavily traded against the euro and the U.S. dollar, but has a spotty presence against other currencies. Prior to the introduction of the euro, both the pound benefited from any doubts about the currency convergence. After the introduction of the euro, Bank of England is attempting to bring the high U.K. rates closer to the lower rates in the euro zone. The pound could join the euro in the early 2000s, provided that the U.K. referendum is positive.

The Swiss Franc. The Swiss franc is the only currency of a major European country that belongs neither to the European Monetary Union nor to the G-7 countries. Although the Swiss economy is relatively small, the Swiss franc is one of the four major currencies, closely resembling the strength and quality of the Swiss economy and finance. Switzerland has a very close economic relationship with Germany, and thus to the euro zone. Therefore, in terms of political uncertainty in the East, the Swiss franc is favored generally over the euro.

Typically, it is believed that the Swiss franc is a stable currency. Actually, from a foreign exchange point of view, the Swiss franc closely resembles the patterns of the euro, but lacks its liquidity. As the demand for it exceeds supply, the Swiss franc can be more volatile than the euro.

2.2. Trade systems on Forex

Trading with brokers. Foreign exchange brokers, unlike equity brokers, do not take positions for themselves; they only service banks. Their roles are to bring together buyers and sellers in the market, to optimize the price they show to their customers and quickly, accurately, and faithfully executing the traders' orders.

The majority of the foreign exchange brokers execute business via phone using an *open box system* — a microphone in front of the broker that continuously transmits everything he or she says on the direct phone lines to the speaker boxes in the banks. This way, all banks can hear all the deals being executed.

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Because of the open box system used by brokers, a trader is able to hear all prices quoted; whether the bid was hit or the offer taken; and the following price. What the trader will not be able to hear is the amounts of particular bids and offers and the names of the banks showing the prices. Prices are anonymous. The anonymity of the banks that are trading in the market ensures the market's efficiency, as all banks have a fair chance to trade.

Sometimes brokers charge a commission that is paid equally by the buyer and the seller. The fees are negotiated on an individual basis by the bank and the brokerage firm.

Brokers show their customers the prices made by other customers either two-way (*bid* and *offer*) prices or one way (*bid* or *offer*) prices from his or her customers. Traders show different prices because they "read" the market differently; they have different expectations and different interests. A broker who has more than one price on one or both sides will automatically optimize the price. In other words, the broker will always show the highest bid and the lowest offer. Therefore, the market has access to an optimal *spread* possible. Fundamental and technical analyses are used for forecasting the future direction of the currency. A trader might test the market by hitting a bid for a small amount to see if there is any reaction.
Another advantage of the brokers' market is that brokers might provide a broader selection of banks to their customers. Some European and Asian banks have overnight desks so their orders are usually placed with brokers who can deal with the American banks, adding to the liquidity of the market.

Direct dealing. Direct dealing is based on trading reciprocity. A market maker—the bank making or quoting a price — expects the bank that is calling to reciprocate with respect to making a price when called upon. Direct dealing provides more trading discretion, as compared to dealing in the brokers' market. Sometimes traders take advantage of this characteristic.

Direct dealing used to be conducted mostly on the phone. Phone dealing was error-prone and slow. Dealing errors were difficult to prove and even more difficult to settle. Direct dealing was forever changed in the mid-1980s, by the introduction of dealing systems.

Dealing systems are on-line computers that link the contributing banks around the world on a one-on-one basis. The performance of dealing systems is characterized by speed, reliability, and safety. Dealing systems are continuously being improved in order to offer maximum support to the dealer's main function: trading. The software is rather reliable in picking up the big figure of the exchange rates and the standard value dates. In addition, it is extremely precise and fast in contacting other parties, switching among conversations, and accessing the database. The trader is in continuous visual contact with the information exchanged on the monitor. It is easier to see than hear this information, especially when switching among conversations.

Most banks use a combination of brokers and direct dealing systems. Both approaches reach the same banks, but not the same parties, because corporations, for instance, cannot deal in the brokers' market. Traders develop personal relationships with both brokers and traders in the markets, but select their trading medium based on price quality, not on personal feelings. The market share between dealing systems and brokers fluctuates based on market conditions. Fast market conditions are beneficial to dealing systems, whereas regular market conditions are more beneficial to brokers.

Matching systems. Unlike dealing systems, on which trading is not anonymous and is conducted on a one-on-one basis, matching systems are anonymous and individual traders deal against the rest of the market, similar to dealing in the brokers' market. However, unlike the brokers' market, there are no individuals to bring the prices to the market, and liquidity may be limited at times. Matching systems are well-suited for trading smaller amounts as well.

The dealing systems' characteristics of speed, reliability, and safety are replicated in the matching systems. In addition, credit lines are automatically managed by the systems. Traders input the total credit line for each counterparty. When the credit line has been reached, the system automatically

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disallows dealing with the particular party by displaying credit restrictions, or shows the trader only the price made by banks that have open lines of credit. As soon as the credit line is restored, the system allows the bank to deal again. In the inter-bank market, traders deal directly with dealing systems, matching systems, and brokers in a complementary fashion.

3. Fundamental analysis by trading on Forex

Two types of analysis are used for the market movements forecasting: fundamental, and technical (the chart study of past behavior of currencies prices). The fundamental one focuses on the theoretical models of exchange rate determination and on the major economic factors and their likelihood of affecting the foreign exchange rates.

3.1. Theories of exchange rate determination

Purchasing power parity. Purchasing power parity states that the price of a good in one country should equal the price of the same good in another country, exchanged at the current rate—the law of one price. There are two versions of the purchasing power parity theory: the absolute version and the relative version. Under the absolute version, the exchange rate simply equals the ratio of the two countries' general price levels, which is the weighted average of all goods produced in a country. However, this version works only if it is possible to find two countries, which produce or consume the same goods. Moreover, the absolute version assumes that transportation costs and trade barriers are insignificant. In reality, transportation costs are significant and dissimilar around the world. Trade barriers are still alive and well, sometimes obvious and sometimes hidden, and they influence costs and goods distribution.

Finally, this version disregards the importance of brand names. For example, cars are chosen not only based on the best price for the same type of car, but also on the basis of the name ("You are what you drive").

Under the PPP relative version, the percentage change in the exchange rate from a given base period must equal the difference between the percentage change in the domestic price level and the percentage change in the foreign price level. The relative version of the PPP is also not free of problems: it is difficult or arbitrary to define the base period, trade restrictions remain a real and thorny issue, just as with the absolute version, different price index weighting and the inclusion of different products in the indexes make the comparison difficult and in the long term, countries' internal price ratios may change, causing the exchange rate to move away from the relative PPP.

In conclusion, the spot exchange rate moves independently of relative domestic and foreign prices. In the short run, the exchange rate is influenced by financial and not by commodity market conditions.

Theory of elasticities. The theory of elasticities holds that the exchange rate is simply the price of foreign exchange that maintains the balance of payments in equilibrium. In other words, the degree to which the exchange rate responds to a change in the trade balance depends entirely on the elasticity of demand to a change in price. For instance, if the imports of country A are strong, then the trade balance is weak. Consequently, the exchange rate rises, leading to the growth of country A's exports, and triggers in turn a rise in its domestic income, along with a decrease in its foreign income. Whereas a rise in the domestic income (in country A) will trigger an increase in the domestic consumption of both domestic and foreign goods and, therefore, more demand for foreign currencies, a decrease in the foreign income (in country B) will trigger a decrease in the domestic consumption of both country B's domestic and foreign goods, and therefore less demand for its own currency.

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The elasticities approach is not problem-free because in the short term the exchange rate is more inelastic than it is in the long term and additional exchange rate variables arise continuously, changing the rules of the game.

Modern monetary theories on short-term exchange rate volatility. The modern monetary theories on short-term exchange rate volatility take into consideration the short-term capital markets' role and the long-term impact of the commodity markets on foreign exchange. These theories hold that the divergence between the exchange rate and the purchasing power parity is due to the supply and demand for financial assets and the international capability.

One of the modern monetary theories states that exchange rate volatility is triggered by a one-time domestic money supply increase, because this is assumed to raise expectations of higher future monetary growth.

The purchasing power parity theory is extended to include the capital markets. If, in both countries whose currencies are exchanged, the demand for money is determined by the level of domestic income and domestic interest rates, then a higher income increases demand for transactions balances while a higher interest rate increases the opportunity cost of holding money, reducing the demand for money.

Under a second approach, the exchange rate adjusts instantaneously to maintain continuous interest rate parity, but only in the long run to maintain PPP. Volatility occurs because the commodity markets adjust more slowly than the financial markets. This version is known as the dynamic monetary approach.

Synthesis of traditional and modern monetary views. In order to better suit the previous theories to the realities of the market, some of the more stringent conditions were adjusted into a synthesis of the traditional and modern monetary theories.

A short-term capital outflow induced by a monetary shock creates a payments imbalance that requires an exchange rate change to maintain balance of payments equilibrium. Speculative forces, commodity markets disturbances, and the existences of short-term capital mobility trigger the exchange rate volatility. The degree of change in the exchange rate is a function of consumers' elasticity of demand.
Because the financial markets adjust faster than the commodities markets, the exchange rate tends to be affected in the short term by capital market changes, and in the long term by commodities changes.

3.2. Economic for the fundamental analysis

For the fundamental analysis on Forex, just as on any goods market, traders use the information from analytical reviews of specialists published in newspapers as well as charts and tables of many numerical indicators serving this purpose. All fundamental indicators generally. released on a monthly basis, except of the Gross Domestic Product and the Employment Cost Index, which are released quarterly (See below).

All economic indicators are released in pairs. The first number reflects the latest period. The second number is the revised figure for the month prior to the latest period. For instance, in July, economic data is released for the month of June, the latest period. In addition, the release includes the revision of the same economic indicator figure for the month of May. The reason for the revision is that the department in charge of the economic statistics compilation is in a better position to gather more information in a month's time. This feature is important for traders. If the figure for an economic indicator is better than expected by 0.4% for the past month, but the previous month's number is revised lower by 0.4%, then traders can draw a justified conclusion about the economy situation.

Economic indicators are released at different times. In the United States, economic data is generally released at 8:30 and 10 AM ET. It is important to remember that the most significant data for foreign exchange is released at 8:30 AM ET. In order to allow time for last-minute adjustments, the United States currency futures markets open at 8:20 AM ET.

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Sources of information. Information on upcoming economic indicators is published in all leading newspapers, such as the *Wall Street Journal,* the *Financial Times,* and the *New York Times;* and business magazines, such as *Business Week.* More often than not, traders use the monitor sources— *Bridge Information Systems*, *Reuters*, or *Bloomberg* — to gather information both from news publications and from the sources' own up-to-date information.

Separate groups of fundamental indicators are considered below in accordance with a generally accepted classification.

Economic indicators

The Gross National Product (GNP). The Gross National Product measures the economic performance of the whole economy. This indicator consists, at macro scale, of the sum of consumption spending, investment spending, government spending, and net trade. The gross national product refers to the sum of all goods and services produced by United States residents, either in the United States or abroad.

The Gross Domestic Product (GDP). The Gross Domestic Product refers to the sum of all goods and services produced in the United States, either by domestic or foreign companies. The differences between the two are nominal in the case of the economy of the United States. GDP figures are more popular outside the United States. In order to make it easier to compare the performances of different economies, the United States also releases GDP figures.

Consumption Spending. Consumption is made possible by personal income and discretionary income. The decision by consumers to spend or to save is psychological in nature. Consumer confidence is also measured as an important indicator of the propensity of consumers who have discretionary income to switch from saving to buying.

Investment Spending. Investment — or gross private domestic spending — consists of fixed investment and inventories.

Government Spending. Government spending is very influential in terms of both sheer size and its impact on other economic indicators, due to special expenditures. For instance, United States military expenditures had a significant role in total U.S. employment until 1990. The defense cuts that occurred at the time increased unemployment figures in the short run.

Net Trade. Net trade is another major component of the GNP. Worldwide internationalization and the economic and political developments since 1980 have had a sharp impact on the United States' ability to compete overseas. The U.S. trade deficit of the past decades has slowed down the overall GNP. GNP can be approached in two ways: flow of product and flow of cost.

Industrial sector indicators

Industrial Production indicator *c*onsists of the total output of a nation's plants, utilities, and mines. From a fundamental point of view, it is an important economic indicator that reflects the strength of the economy, and by extrapolation, the strength of a specific currency. Therefore, foreign exchange traders use this economic indicator as a potential trading signal.

Capacity utilization indicator consists of total industrial output divided by total production capability. The term refers to the maximum level of output a plant can generate under normal business conditions. In general, capacity utilization is not a major economic indicator for the foreign exchange market. However, there are instances when its economic implications are useful for fundamental analysis. A "normal" figure for a steady economy is 81.5 percent. If the figure reads 85 percent or more, the data suggests that the industrial production is overheating, that the economy is close to full capacity.

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High capacity utilization rates precede inflation, and expectation in the foreign exchange market is that the central bank will raise interest rates in order to avoid or fight inflation.

Factory orders. Refer to the total of durable and nondurable goods orders. Nondurable goods consist of food, clothing, light industrial products, and products designed for the maintenance of durable goods. Durable goods orders are discussed separately. The factory orders indicator has limited significance for foreign exchange traders.

Durable goods orders. Consist of products with a life span of more than three years. Examples of durable goods are autos, appliances, furniture, jewelry, and toys. They are divided into four major categories: primary metals, machinery, electrical machinery, and transportation.

In order to eliminate the volatility pertinent to large military orders, the indicator includes a breakdown of the orders between defense and non-defense.

This data is fairly important to foreign exchange markets because it gives a good indication of consumer confidence. Because durable goods cost more than nondurables, a high number in this indicator shows consumers' propensity to spend. Therefore, a good figure is generally bullish for the domestic currency.

Business inventories. Consist of items produced and held for future sale. The compilation of this information is facile and holds little surprise for the market. Moreover, financial management and computerization help control business inventories in unprecedented ways. Therefore, the importance of this indicator for foreign exchange traders is limited.

Construction Data

Construction indicator constitutes significant group that are included in the calculation of the GDP of the United States. Moreover, housing has traditionally been the engine that pulled the U.S. economy out of recessions after World War II. These indicators are classified into three major categories:

1. housing starts and permits
2. new and existing one-family home sales; and
3. construction spending.

Construction indicators are cyclical and very sensitive to the level of interest rates (and consequently mortgage rates) and the level of disposable income. Low interest rates alone may not be able to generate a high demand for housing, though. As the situation in the early 1990s demonstrated, despite historically low mortgage rates in the United States, housing increased only marginally, as a result of the lack of job security in a weak economy. Besides, in spite of the 2000 – 2001 recession the cost of houses, for example in California, was practically not decreased.

Housing starts between one and a half and two million units reflect a strong economy, whereas a figure of approximately one million units suggests that the economy is in recession.

Inflation indicators

Traders watch the development of inflation closely, because the method of choice for fighting inflation is raising the interest rates, and higher interest rates tend to support the local currency. To measure inflation traders use economic tools considered below.

Producer price index (PPI). It's compiled from most sectors of the economy, such as manufacturing, mining, and agriculture. The sample used to calculate the index contains about 3400 commodities. The weights used for the calculation of the index for some of the most important groups

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are: food—24 percent; fuel—7 percent; autos—7 percent; and clothing—6 percent. Unlike the CPI, the PPI does not include imported goods, services, or taxes.

Consumer price index (CPI). Reflects the average change in retail prices for a fixed market basket of goods and services. The CPI data is compiled from a sample of prices for food, shelter, clothing, fuel, transportation, and medical services that people purchase on daily basis. The weights attached for the calculation of the index to the most important groups are: housing—38 percent; food—19 percent; fuel—8 percent; and autos—7 percent.

The two indexes, PPI and CPI, are instrumental in helping traders measure inflationary activity, although the Federal Reserve takes the position that the indexes overstate the strength of inflation.

Gross national product implicit deflator. It's calculated by dividing the current dollar GNP figure by the constant dollar GNP figure.

Gross domestic product implicit deflator. It's calculated by dividing the current dollar GDP figure by the constant dollar GDP figure.

Both the GNP and GDP implicit deflators are released quarterly, along with the respective GNP and GDP figures. The implicit deflators are generally regarded as the most significant measure of inflation.

Commodity research bureau's (CRB) futures index . The Commodity Research Bureau's Futures Index makes watching for inflationary trends easier. The CRB Index consists of the equally weighted futures prices of 21 commodities. The components of the CRB Index are:

- Precious metals: gold, silver and platinum
- Industrials: crude oil, heating oil, unleaded gas, lumber, copper, and cotton
- Grains: corn, wheat, soybeans, soy meal, soy oil
- Livestock and meat: cattle, hogs, and pork bellies
- Imports: coffee, cocoa, sugar
- Miscellaneous: orange juice

The preponderance of food commodities makes the CRB Index less reliable in terms of general inflation. Nevertheless, the index is a popular tool that has proved quite reliable since the late 1980s.

The "Journal of Commerc" industrial price index (JoC). Consists of the prices of 18 industrial materials and supplies processed in the initial stages of manufacturing, building, and energy production. It is more sensitive than other indexes, as it was designed to signal changes in inflation prior to the other price indexes.

Merchandise trade balance

It's one of the most important economic indicators. Its value may trigger long-lasting changes in monetary and foreign policies. The trade balance consists of the net difference between the exports and imports of a certain economy. The data includes six categories:

1. food,
2. raw materials and industrial supplies,
3. consumer goods,
4. autos,
5. Capital goods,
6. Other merchandise.

A separate indicator that belongs to that group is the "***US – Japan Merchandise Trade Balance***".

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Employment Indicators.

The employment rate is an economic indicator with significance in multiple areas. The rate of employment, naturally, measures the soundness of an economy (See Figure 3.1). The unemployment rate is a lagging economic indicator. It is an important feature to remember, especially in times of economic recession. Whereas people focus on the health and recovery of the job sector, employment is the last economic indicator to rebound. When economic contraction causes jobs to be cut, it takes time to generate psychological confidence in economic recovery at the managerial level before new positions are added. At individual levels, the improvement of the job outlook may be clouded when new positions are added in small companies and thus not fully reflected in the data. The employment reports are significant to the financial markets in general and to foreign exchange in particular. In foreign exchange, the data is truly affective in periods of economic transition—recovery and contraction. The reason for the indicators' importance in extreme economic situations lies in the picture they paint of the health of the economy and in the degree of maturity of a business cycle. A decreasing unemployment figure signals a maturing cycle, whereas the opposite is true for an increasing unemployment indicator.

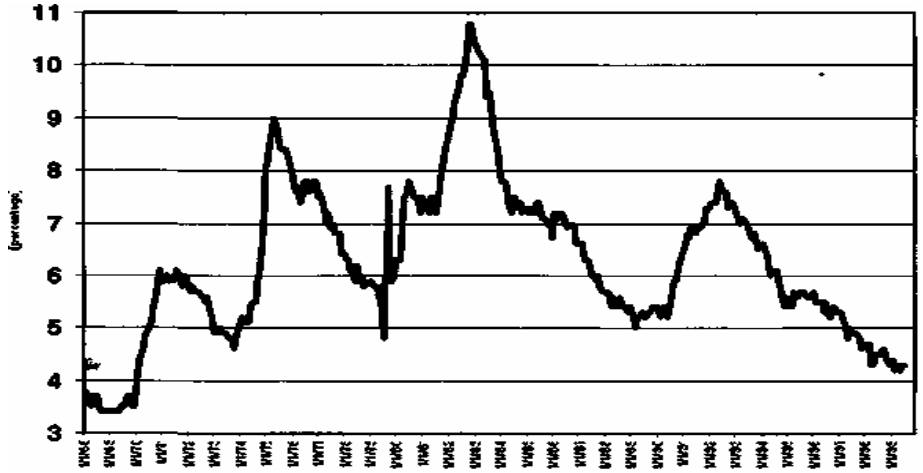

Figure 3.1. Diagram of the U.S. unemployment rate.

Consumer spending indicators. *Retail sales* are a significant consumer-spending indicator for foreign exchange traders, as it shows the strength of consumer demand as well as consumer confidence. component in the calculation of other economic indicators, such as GNP and GDP.

Generally, the most commonly used *employment figure* is not the monthly unemployment rate, which is released as a percentage, but the nonfarm payroll rate. *The rate* figure is calculated as the ratio of the difference between the total labor force and the employed labor force, divided by the total labor force. The data is more complex, though, and it generates more information. In Forex, the standard indicators monitored by traders are the unemployment rate, manufacturing payrolls, nonfarm payrolls, average earnings, and average workweek. Generally, the most significant employment data are manufacturing and nonfarm payrolls, followed by the unemployment rate.

Employment Cost Index (ECI). The Employment Cost Index measures wages and inflation and provides a comprehensive analysis of worker compensation, including wages, salaries and fringe benefits.

Consumer Spending Indicators grounded on data due to the retail sale volume is important for the Forex because it shows the level of consumers demand and their sentiments, which is initial data for the calculation of other indicators as Gross National and Gross Domestic Products.

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Retail Sails. Retail sales are a significant consumer-spending indicator for foreign exchange traders, as it shows the strength of consumer demand as well as consumer confidence. As an economic indicator, retail sales are particularly important in the United States. Unlike other countries such as Japan, the focus in the U.S. economy is the consumer. If the consumer has enough discretionary income, or enough credit for that matter, then more merchandise will be produced or imported. Retail sales figures create an economic process of "trickling up" to the manufacturing sector.

The seasonal aspect is important for this economic indicator. The retail sales months that are most watched by foreign exchange traders are December, because of the holiday season, and September, the back-to-school month. Increasingly, November is becoming an important month, as a result of the shift in the former after-Christmas sales to pre-December sales days. Another interesting phenomenon occurred in the United States. Despite the economic recession in the early 1990s, the volume of retail sales was unusually high. The profit margin, however, was much thinner. The reason is the consumer's shift toward discount stores.

Traders watch retail sales closely to gauge the overall strength of the economy and, consequently, the strength of the currency. This indicator is released on a monthly basis.

Consumer sentiment . It's a survey of households that is designed to gauge direct the individual propensity for spending money to increase or to maintain on the same level their expenditures connected with the satisfaction of the household current needs and, by implication, - the situation on the labor market.

Auto sales. Despite the importance of the auto industry in terms of both production and sales, the level of auto sales is not an economic indicator widely followed by foreign exchange traders. The American automakers experienced a long, steady market share loss, only to start rebounding in the early 1990s. But car manufacturing has become increasingly internationalized, with American cars being assembled outside the United States and Japanese and German cars assembled within the United States. Because of their confusing nature, auto sales figures cannot easily be used in foreign exchange analysis.

Leading indicators

- The *leading indicators* consist of the following economic indicators:
- Average workweek of production workers in manufacturing
- Average weekly claims for state unemployment
- New orders for consumer goods and materials (adjusted for inflation)
- Vendor performance (companies receiving slower deliveries from suppliers)
- Contracts and orders for plant and equipment (adjusted for inflation)
- New building permits issued
- Change in manufacturers' unfilled orders, durable goods
- Change in sensitive materials prices

Personal income. It's the income received by individuals, nonprofit institutions, and private trust funds. Components of this indicator include wages and salaries, rental income, dividends, interest earnings, and transfer payments (Social Security, state unemployment insurance, and veterans' benefits). The wages and salaries reflect the underlying economic conditions. This indicator is vital for the sales sector. Without an adequate personal income and a propensity to purchase, consumer purchases of durable and nondurable goods are limited. For FX traders, personal income is not significant.

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3.3. Forex dependence on financial and sociopolitical factors

Financial factors are vital to fundamental analysis. Changes in a government's monetary or fiscal policies are bound to generate changes in the economy, and these will be reflected in the exchange rates. Financial factors should be triggered only by economic factors. When governments focus on different aspects of the economy or have additional international responsibilities, financial factors may have priority over economic factors. This was painfully true in the case of the European Monetary System (EMS) in the early 1990s. The realities of the marketplace revealed the underlying artificiality of this approach.

The role of interest rates. Using the interest rates independently from the real economic environment translated into a very expensive strategy. Because foreign exchange, by definition, consists of simultaneous transactions in two currencies, then it follows that the market must focus on two respective interest rates as well. This is the *interest rate differential,* a basic factor in the markets. Traders react when the interest rate differential changes, not simply when the interest rates themselves change. For example, if all the *G-5* countries decided to simultaneously lower their interest rates by 0.5 percent, the move would be neutral for foreign exchange, because the interest rate differentials would also be neutral. Of course, most of the time the discount rates are cut unilaterally, a move that generates changes in both the interest differential and the exchange rate. Traders approach the interest rates like any other factor, trading on expectations and facts. For example, if rumor says that a discount rate will be cut, the respective currency will be sold before the fact. Once the cut occurs, it is quite possible that the currency will be bought back, or the other way around. An unexpected change in interest rates is likely to trigger a *sharp* currency move.

Other factors affecting the trading decision are the time lag between the rumor and the fact, the reasons behind the interest rate change, and the perceived importance of the change. The market generally prices in a discount rate change that was delayed. Since it is a fait accompli, it is neutral to the market. If the discount rate was changed for political rather than economic reasons, a common practice in the European Monetary System, the markets are likely to go against the central banks, sticking to the real fundamentals rather than the political ones. This happened in both September 1992 and the summer of1993, when the European central banks lost unprecedented amounts of money trying to prop up their currencies, despite having high interest rates. The market perceived those interest rates as artificially high and, therefore, aggressively sold the respective currencies. Finally, traders deal on the perceived importance of a change in the interest rate differential.

Political crises influence. A political crisis is commonly dangerous for the Forex because it may trigger a sharp decrease in trade volumes. Prices under critical conditions dry out quickly, and sometimes the spreads between bid and offer jump from 5 pips to 100 pips. Unlike predictable political events (parliament elections, interstate agreements conclusion etc), which generally take place in an exact time and give market the opportunity to adopt, political crises come and strike suddenly. Currency traders have a knack for responding to crises. The traders should react as fast as possible to avoid big losses. They have not much time to take decisions, often they have only seconds. Return on the market after a crisis is often problematic.

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4. Technical analysis

4.1. The destination and fundamentals of technical analysis

Technical analysis is being used for the prediction of market movements (that is alterations in currencies prices, volumes and open interests) outgoing from the information obtained for the past. The main instruments of the technical analysis are different kinds of *charts*, which represent currencies price change during a certain time preceding exchange deals, as well as *technical indicators*. The latter are being obtained as a result of the mathematical processing of averaged and other characteristics of price movements. The instruments of the technical analysis are universal and applicable to any Forex sector, any currency and any time span.

Technical analysis is easy to compute what is important while the technical services are becoming increasingly sophisticated and reasonably priced. They are available to all the Forex participants independent on their trade plans, strategies applied and the time of position continuance. Under contemporary conditions it is executed by means of computers, which is important if to account that means of the electronic support become more and more sophisticated.

Dow theory

The fundamental principles of technical analysis are based on the Dow Theory with the following main thesis:

1. The price is a comprehensive reflection of all the market forces. At any given time, all market information and forces are reflected in the currency prices ("*The market knows everything*").
2. Price movements are trend followers ("*Trend is your friend*"); trends are classified as up trends (bullish), downtrends (bearish) and flat (sideways). Examples of mentioned trends are given on Figures 4.1 – 4.3.
3. Price movements are historically repetitive ("*The history repeats*") which results periodical emerging the same patterns on the charts.
4. The market has three trends: the longest (about 1 year) *major*, or *primary*, less enduring (1 month and more) *intermediate*, or *secondary*, and rather short (several days or weeks) *minor*. The primary trend has three phases: accumulation, run-up/run-down, and distribution. In this way, in the accumulation phase of a bullish market the shrewdest traders enter new positions. In the run-up/run-down phase, the majority of the market finally "sees" the move and jumps on the bandwagon. Finally, in the distribution phase, the keenest traders take their profits and close their positions while the general trading interest slows down in an overshooting market. The secondary trend is a correction to the primary trend and may retrace one-third, one-half or two-thirds from the primary trend. In frame of a major trend may be any amount of secondary or minor trends. The structure of a bullish trend is shown on Figure 4.5.
5. Trends exist until it is not broken (See Figures 4.2, 4.3) and their reversals are confirmed. Figure 4.4 shows example of reversals in a bearish currency market. The buying signals occur at points A and B when the currency exceeds the previous highs.

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Figure 4.1. Example of a bullish trend in the Japanese yen chart.

Figure 4.2. Example of a bearish trend and a break in the Euro chart.

6. Volume must confirm the trend. *Volume* consists of the total amount of currency traded within a period of time, usually one day. Large trading volume suggests that there is interest and liquidity in a certain market, and low volume warns the trader to close positions. *Open interest* is the total exposure, or outstanding position, in a certain instrument. Volume and open interest figures are available from different sources, although one day late such as the newswires (*Bridge Information Systems*, *Reuters*, *Bloomberg*), newspapers (the *Wall Street Journal,* the *Journal of Commerce*), weekly printed charts (*Commodity Perspective*, *Commodity Trend Service*).

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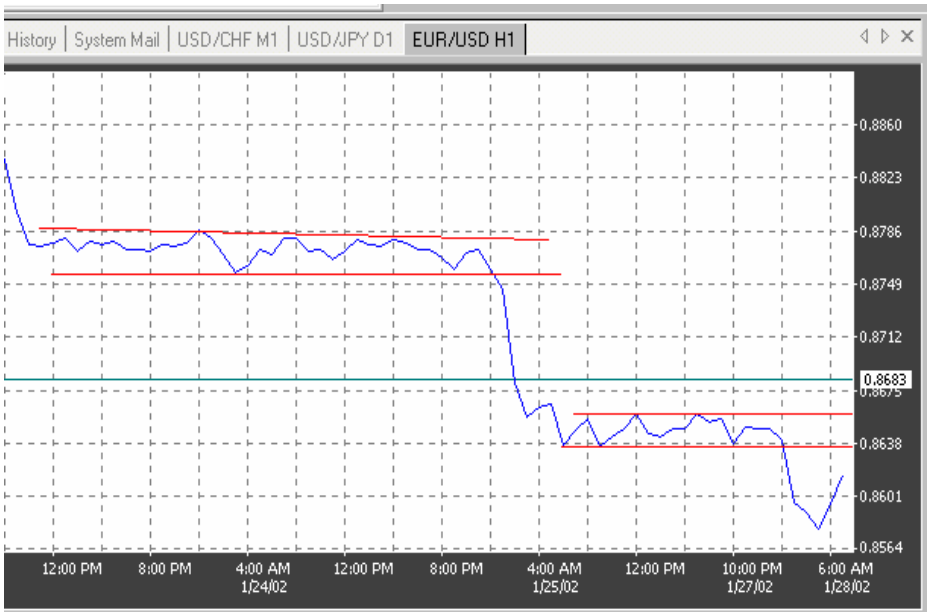

Figure 4.3. Example of sideways and breaks in the Euro chart

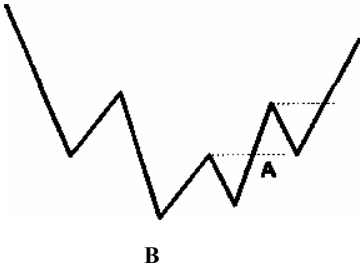

Figure 4.4. Diagram of the bearish market reversal.

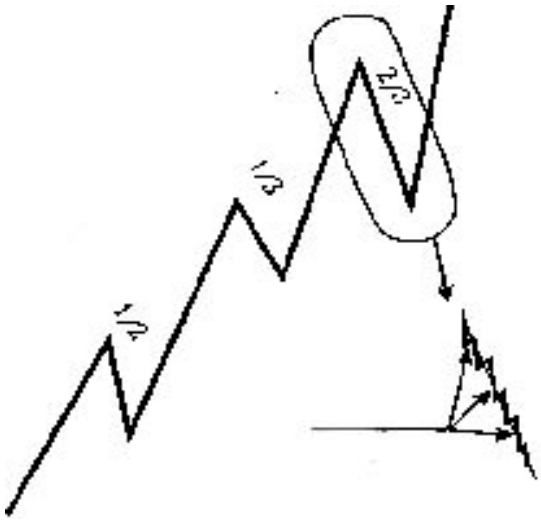

Figure 4.5. Diagram of the bullish trend structure: the left side – the major trend with intermediate trends, the bottom part of the left side – minor trends of the encircled secondary trend.

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Percentage measures of price reversals. The price of a foreign currency even on the strongest trends is never moving constantly up or down. Traders watch possible reversals (a change in the movement direction) at certain points of charts.

There are three following typical points of a possible reversal that can be marked on a chart in percents against the preceded movements (percentage retrenchments):

1. Along *Charles Dow* a reversal up traditionally is occurring after the price has passed down 1/3 (33%), ½ (50%) or 2/3 (66%) of the latest rise up. The reversal after 66% is considered as a trend correction.
2. Using *Fibonacci constants* (See Chapter 5) one may wait for a reversal up at the downtrend points at 0.382 (38%), 0.5 (50%) and 0.618 (62%) of the latest rise up.
3. Along *Gann* one has to wait for a reversal up after each 1/8 of the latest rise up on the path down.

4.2. Charts for the technical analysis

Kinds of prices and time units. Charts for the technical analysis are being constructed in coordinates "*price* (the vertical axis) – *time* (the horizontal axis)". The following kinds of currency prices represented on charts are being distinguished on Forex:

- ***open*** – a price at the beginning of a trade period (year, month, day, week, hour, minute or a certain amount of one from these units);
- ***close*** - a price at the end of a trade period;
- ***high*** – the highest from prices observed during a trade period;
- ***low*** – the lowest from prices observed during a trade period.

Providing the technical analysis one uses charts for different time units – from 1 year or more till 1 minute. For instance, the computer program *RoyalForex* allows to analyze price movements charts for 1 day, 4 hours, 30 minutes, 15 minutes, 5 minutes and 1 minute. The bigger is a time unit applied for the chart plotting the bigger is a time span to analyze price movements and to determine the major trend by means of the chart. For the short trading charts for less time units are more suitable.

Line chart. The line chart is plotted connecting single prices for a selected time period. The most popular line chart is the daily chart. Although any point in the day can be plotted, most traders focus on the closing price, which they perceive as the most important. (See Figure 4.6). But an immediate problem with the daily line chart is the fact that it is impossible to see the price activity for the balance of the period as well as *gaps* (See chapter 4.6) – breakups in prices at joints of trade periods. Nevertheless, line charts are easier to visualize. Also, technical analysis goes well beyond chart formation; in order to execute certain models and techniques, line charts are better suited than any of the other charts.

Bar chart. The bar chart consists from separate *histograms* (See figure 4.7). To plot a histogram in coordinates *price – time* the points responding to *high*, *low*, *open* and *close* prices for a time period analyzed should be marked on the one vertical bar. The opening price usually is marked with a little horizontal line to the left of the bar; and the closing price is marked with a little horizontal line to the right of the bar.

Bar charts have the obvious advantage of displaying the currency range for the period selected. An advantage of this chart is that, unlike line charts, the bar chart is able to plot price gaps. Hence, it is impossible to see on a bar chart absolutely all price movements during the period.

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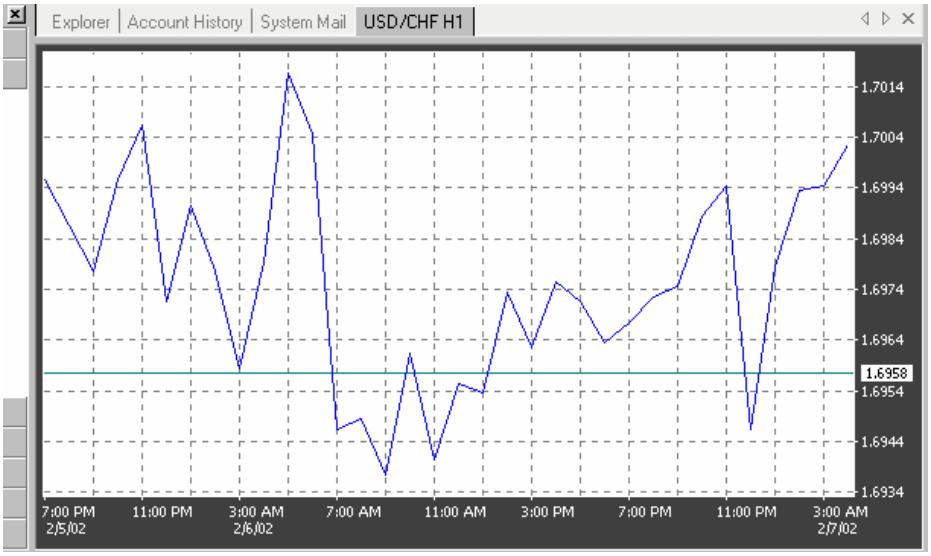

Figure 4.6. Example of a line chart of the Swiss franc.

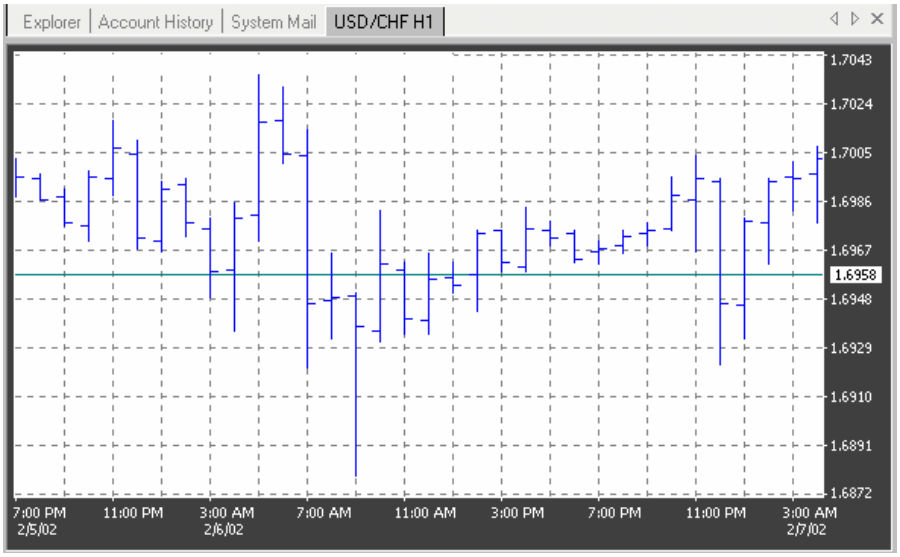

Figure 4.7. Example of histograms plotted in the Swiss franc chart.

Candlestick chart. The candlestick chart is closely related to the bar chart. It also consists of four major prices: *high*, *low*, *open*, and *close* (See Figure 4.8). In addition to the common readings, the candlestick chart has a set of particular interpretations. The latter is possible thanks to the convenient visual observation of that chart.

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Figure 4.8. Example of a candlesticks plotted in the Swiss franc chart.

The opening and closing prices form the *body (jittai)* of the candlestick. To indicate that the opening was lower than the closing, the body of the bar is left blank. Current standard electronic displays allow you to keep it blank or select a color of your choice. If the currency closes below its opening, the body is filled. In its original form, the body was colored black, but the electronic displays allow you to keep it filled or to select a color of your choice.

The intraday (or weekly) direction on a candlestick chart can be traced by means of two "shadows": the *upper shadow (uwakage)* and the *lower shadow (shitakage).* Just as with a bar chart, the candlestick chart is unable to trace every price movement during a period's activity.

4.3. Lines of trends, support and resistance

The trendline. A trendline is a main initial element for the price chart analysis. While the market moves in any direction not along a straight line but along a zigzag, the mutual placement of upper and bottom points of those zigzags permits to plot a line connecting the significant highs (peaks) or the significant lows (troughs) of an appropriate zigzag using technical tools of the computer program (See Figures 4.1 – 4.3). To draw a trendline only two points are necessary and the third one is the contact point confirmation. On a bullish trend chart it should be drawn using troughs, on a bearish – using peaks. The trendline and a line which is about parallel to it and drawn on the opposite side (through peaks on a dullish trend and through troughs on a bearish) form *the trade channel*. Both lines are then channel's borders. Examples of trade channels are shown on Figures 4.9, 4.10.

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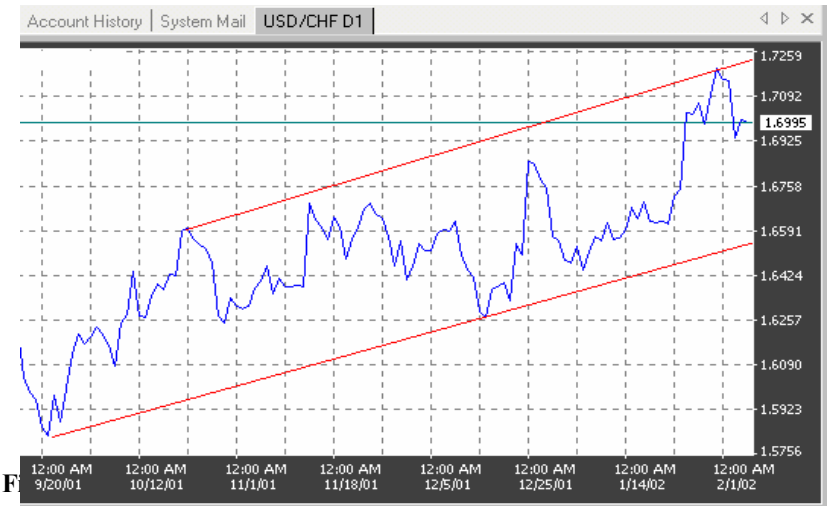

Lines of support and resistance. The upper and the bottom borders of trade channels are called accordingly *support* and *resistance* lines. The peaks represent the price levels at which the selling pressure exceeds the buying pressure. They are known as *resistance levels.* The troughs, on the other hand, represent the levels at which the selling pressure succumbs to the buying pressure. They are called *support levels.* In an uptrend, the consecutive support and resistance levels must exceed each other respectively. The reverse is true in a downtrend. Although minor exceptions are acceptable, these failures should be considered as warning signals for trend changing.

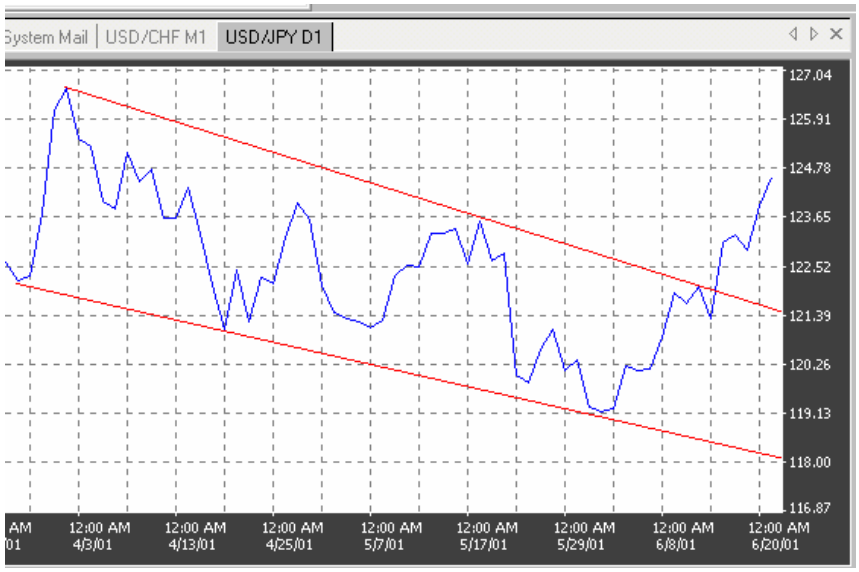

Figure 4.10. Example of a bearish channel and his break plotted in the Japanese yen chart.

The significance of trends is a function of time and volume. The longer the prices bounce off the support and resistance levels, the more significant the trend becomes. Trading volume is also very important, especially at the critical support and resistance levels. When the currency bounces off these levels under heavy volume, the significance of the trend increases.

The importance of support and resistance levels goes beyond their original functions. If these levels are convincingly penetrated, they tend to turn into just the opposite. A firm support level, once it is

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penetrated on heavy volume, will likely turn into a strong resistance level. (See Figure 4.11). Conversely, a strong resistance turns into a firm support after being penetrated. (See Figure 4.2).

In general, to evaluate the reliability (that is the possibility of a break) of the trade channel borders taking a decision to close or to save an existing position one should govern himself with following rules:

1. A channel is the more reliable the longer it exists. Hence, the "solidity" of very old channels (e.g. existing more than 1 year) decreased sharply.
2. A channel is the more reliable the more is his width ("*It takes time to break channel*").
3. The resistance may be broken if it is bounced on the background of a growing volume ("*It takes volume to break resistance*").
4. A steep channel is less reliable in compare to a gentle one.
5. The support may be broken independent on the volume ("*under own weight*").

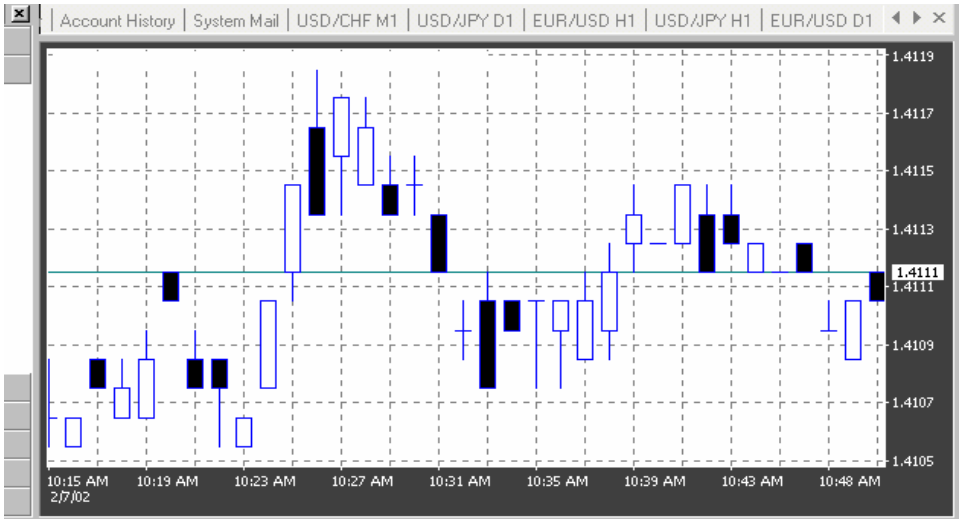

Figure 4.11. Example of resistance turned into support in the Pound Sterling chart.

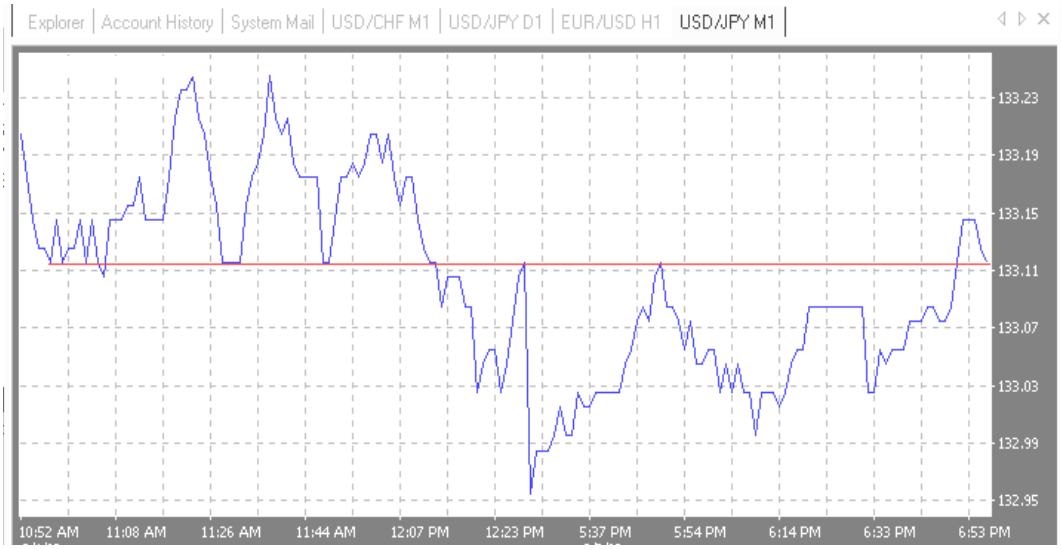

Figure 4. 12. Example of support turned into resistance in the Japanese yen chart.

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4.4. Trend Reversal Patterns

Independent, which time unit, is applied price movement charts form different kinds of periodically repeating equal patterns. Some of those patterns always occur on charts before the trend reversal when the volume is significantly decreasing or increasing. Such formations known as *reversal patterns* are considered below.

Head-And-Shoulders. The head-and-shoulders pattern is one of the most reliable and well-known chart formations. It consists of three consecutive rallies (See Figure 4.13). The first and third rallies—the *shoulders*—have about the same height, and the middle one—the head—are the highest. All three rallies are based on the same support line (or on the resistance line in the case of the reversed head-and-shoulders formation), known as the *neckline.* A real example of the head-and-shoulders pattern is shown on the Figure 4.14.

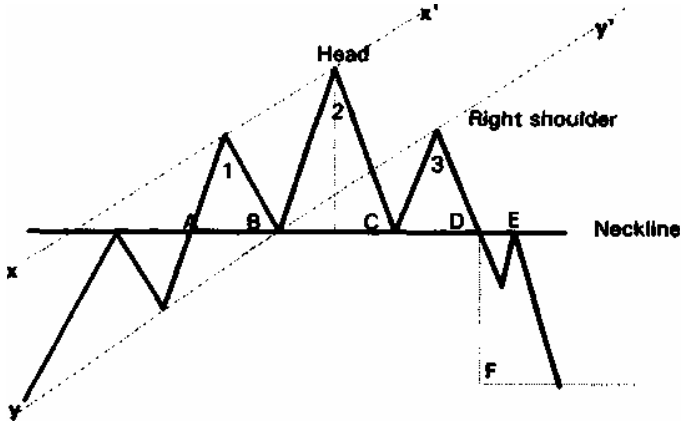

Figure 4.13. Diagram of a typical Head-And-Shoulders pattern.

Prior to point *A*, the neckline was a resistance line. Once the resistance line was broken, it turned into a significant support line. The price bounced off it twice, at point's *B* and *C*. The neckline was eventually broken in point *D*, under heavy volume, and the trend reversal was confirmed. As the significant support line was broken, a retrenchment could be expected to retest the neckline (*E*), now a resistance line again. If the resistance line held, the price was expected to eventually decline to around level *F*, which was the price target of the head-and-shoulders formation. The target was approximately equal in amplitude to the distance between the top of the head and the neckline. The price target was measured from point *D*, where the neckline was broken (line *DF* on Figure 4.13).

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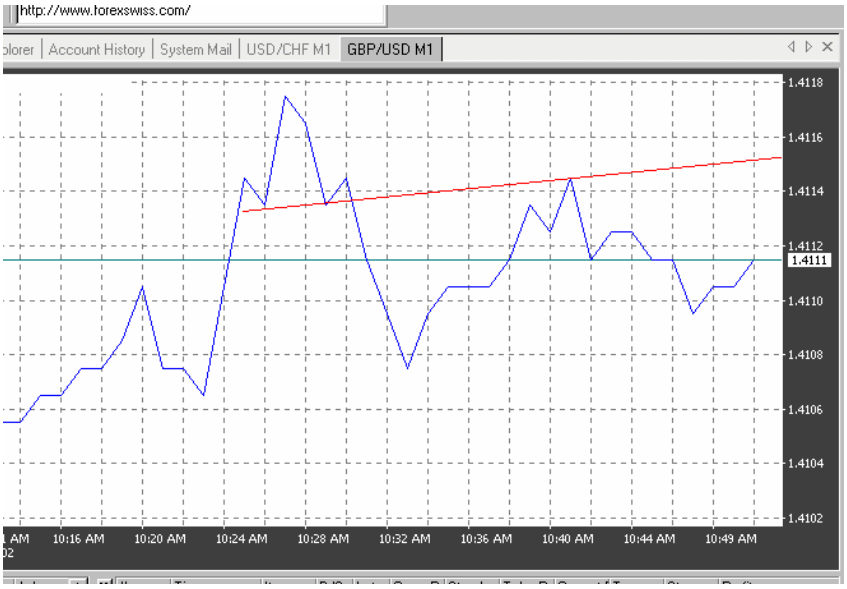

Figure 4.14. Example of a real head-and-shoulders pattern in the Pound Sterling chart.

Signals generated by the head-and-shoulders pattern. The head-and-shoulders formation provides excellent information:

1.The *support line.* This is based on point's *B* and *C*.

2. The *resistance line.* After giving in at point *D*, the market may retest the neckline at point *E*.

3. The *price direction.* If the neckline holds the buying pressure at point *E*, then the formation provides information regarding the price direction: diametrically opposed to the direction of the head-and-shoulders (bearish).

4. The *price target.* This is provided by the confirmation of the formation (by breaking through the neckline under heavy trading volume).

One of the main requirements of the successful development of this formation is that the breakout through the neckline occurs under heavy market volume. A breakout on light volume is a strong warning that it is a false breakout and will trigger a sharp backlash in the currency price. The time frame for this chart formation's evolution is anywhere from several weeks to several months. The intraday chart formations are not reliable.

Inverted Head-And-Shoulders. The inverted head-and-shoulders formation is a mirror image of the previous pattern. (See a diagram on Figure 4.15 and a real example on Figure 4.16). Therefore, you can apply the same characteristics, potential problems, signals, and trader's point of view from the preceding presentation. The underlying currency broke out of the downtrend ranged by the *xx'-yy'* channel. The currency retested the previous resistance line (the rally number 3), now turned into a support line. Among the three consecutive rallies, the shoulders (1 and 3) have approximately the same height, and the head is the lowest. Prior to point *A*, the neckline was a support line. Once this line was broken, it turned into a significant resistance line. The price bounced off the neckline twice, at point's *B* and *C*. The neckline was eventually broken at point *D*, under heavy volume. As the significant resistance line was broken, a retrenchment could be expected to retest the neckline (*E*), now a support line again. If it held, the price was expected to eventually rise to around level *F*, which is the price target of the head-and-shoulders formation. The price objective is approximately equal in amplitude to the distance between the top of the head and the neckline, and is measured from the breakout point, *D*.

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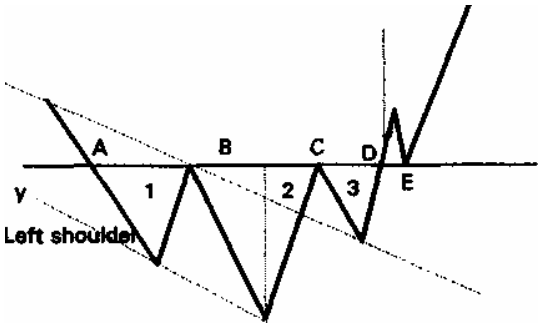

Figure 4.15. Diagram of a typical inverted head-and-shoulders pattern.

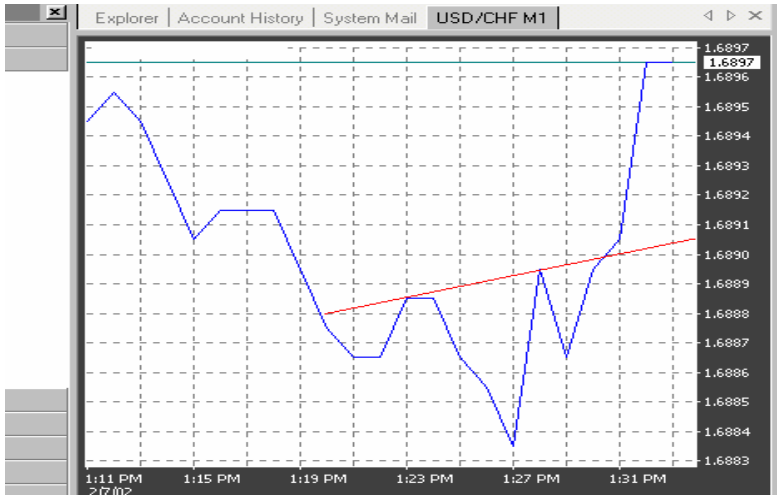

Figure 4.16. An example of an inverted head-and-shoulders pattern in the Swiss franc chart.

Double Top. Another very reliable and common trend reversal chart formation is the double top. As the name clearly and succinctly describes, this pattern consists of two tops (peaks) of approximately equal heights (See Figures 4.17 and 4.18). As it is shown on the Figure 4.17, a parallel line is drawn against a resistance line that connects the two tops. We should think of this line as identical to the head-and-shoulders' neckline. As a resistance line, it is broken at point *A*. It turns into a strong support for price level at *C*, but eventually fails at point *E*. The support line turns into a strong resistance line, which holds the market backlash at point F. The price objective is at level *G*, which is the average height of the double top formation, measured from point *E*.

Signals provided by the double top formation. The double top formation provides information on:

1. The *support line,* set between points *A* and *E*.
2. The *resistance line,* set between points *B* and *D*.
3. The *price direction.* If the neckline holds the buying pressure at point *F*, then the formation provides information regarding the price direction: diametrically opposed to the direction of the peaks (bearish).

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4. The *price target,* provided by the confirmation of the formation (by breaking through the neckline under heavy trading volume.)

Exactly as in the case of the head-and-shoulders pattern, a vital requirement for the successful completion of the double-top formation is that the breakout through the neckline occurs under heavy market volume. A breakout on light volume is a strong case for a false breakout, which would trigger a *sharp* backlash in the currency price. The time frame for this chart formation's evolution is anywhere from several weeks to several months. The intraday chart formations are less reliable. There is a strong correlation between the length of time to develop the pattern and the significance of the formation.

The target is unlikely to be reached in a very short time frame. There is no direct suggestion regarding the length of target reaching time; but foreign exchange common sense links it to the duration of development. It is important to measure the target from the point where the neckline was broken. Avoid the trap of measuring the target price from the middle of the formation under the neckline. This may happen as you measure the average height of the formation.

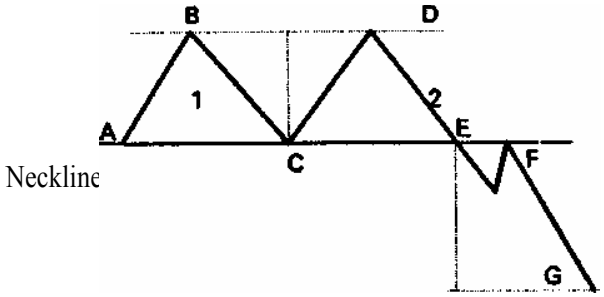

Figure 4.17. Diagram of a typical double-top formation.

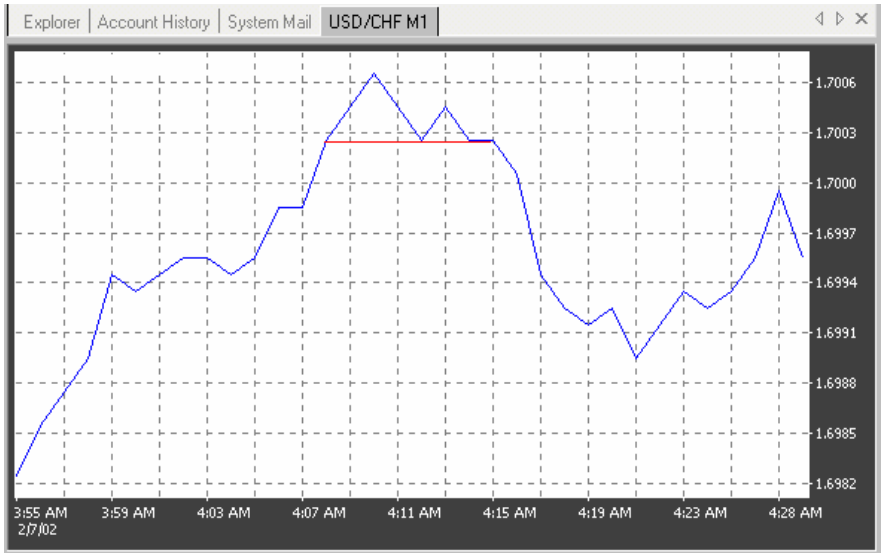

Figure 4.18. An example of a double-top formation in the Swiss franc chart.

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Double Bottom. The double bottom formation is a mirror image of the previous pattern (See Figures 4.19 and 4.20). Therefore, one may apply the same characteristics, potential problems, signals, and trader's point of view from the preceding presentation. As it is shown on Figure 4.19, the bottoms have about the same amplitude. A parallel line (the neckline) is drawn against the line connecting the two bottoms (*B* and *D*.) As a support line, it is broken at point *A*. It turns into a strong resistance for price level at *C*, but eventually fails at point *E*. The resistance line turns into a strong support line, which holds the market backlash at point *F*. The price objective is at level G, which is the average height of the bottoms, measured from point *E*.

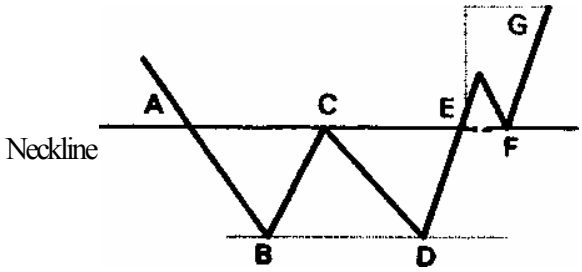

Figure 4.19. Diagram of a typical double-bottom formation.

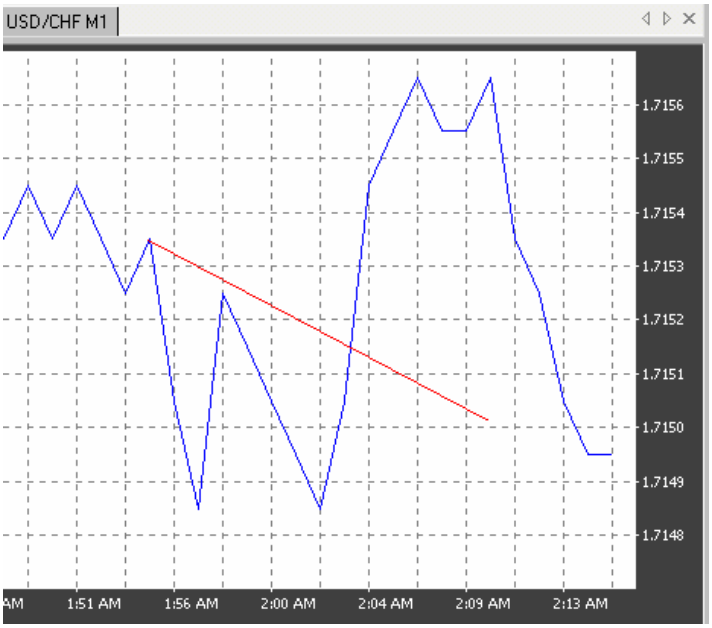

Figure 4.20. An example of a double-bottom formation in the Swiss franc chart.

Triple Top. The triple top is a hybrid of the head-and-shoulders and double-top trend reversal formations (See Figures 4.21 and 4.22). Consequently, they have the same characteristics, potential problems, signals, and trader's point of view as the double top or double bottom, respectively.

As shown in Figure 4.21, in a typical triple-top formation, the tops have about the same height. A parallel line (the neckline) is drawn against the line connecting the three tops (*B*, *D*, and *F*). As a resistance line, the neckline is broken at point *A*. It turns into a strong support for price levels at *C* and *E*, but eventually fails at point *G*.

The support line turns into a strong resistance line, which holds the market backlash at point *H*. The price objective is at level *I*, which is the average height of the three tops formation, as measured from point *D*. As a double top, the formation fails at point *E*. The price moves up steeply toward point *F*. The

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resistance line is holding once more and the price drops sharply again toward point *G*. At this level, the market pressure is able to penetrate the support line. After a possible retest of the neckline, the prices drop further, to eventually reach the price objective.

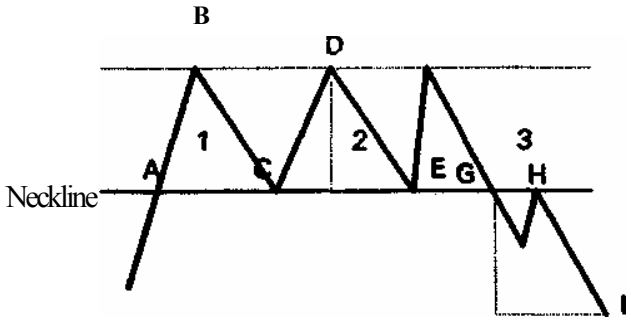

Figure 4.21. Diagram of a triple-top formation.

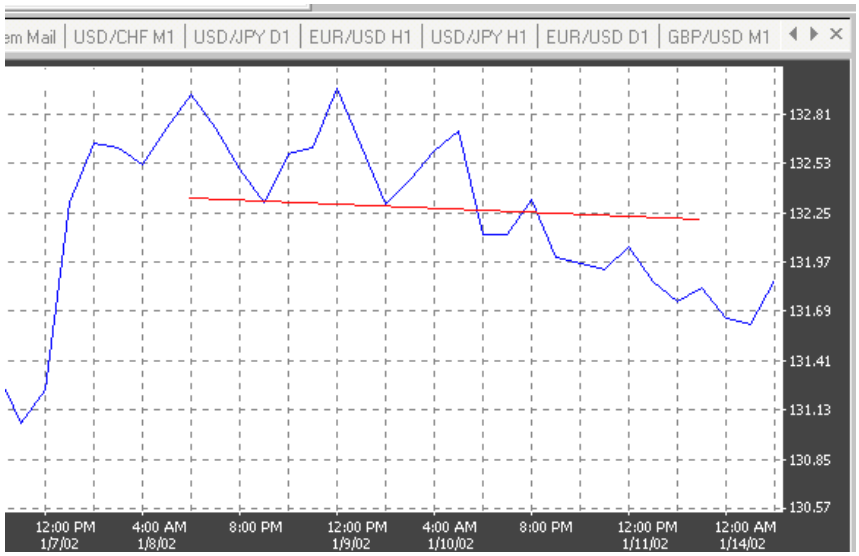

Figure 4.22. An example of a triple-top formation in the Japanese yen chart.

Triple Bottom. Triple Bottom is a hybrid of the double top and inverted head-and-shoulders patterns (See Figures 4.23 and 4.24). As shown in Figure 4.23, in a triple-bottom formation, the bottoms have about the same amplitude. *A* parallel line (the neckline) is drawn against the line connecting the three bottoms (*B*, *D*, and *F*). As a support line, the neckline is broken at point *A*. It turns into a strong resistance for price levels at *C* and *E*, but eventually fails at point *G*. The resistance line turns into a strong support line, which holds the market backlash at point *H*. The price objective is at level *I*, which is the average length of the triple-bottom formation, as measured from point *D*.

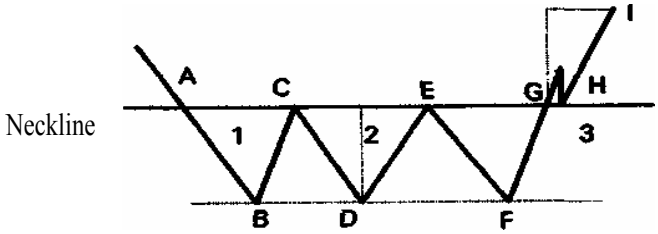

Figure 4.23. Diagram of a typical triple-bottom formation.

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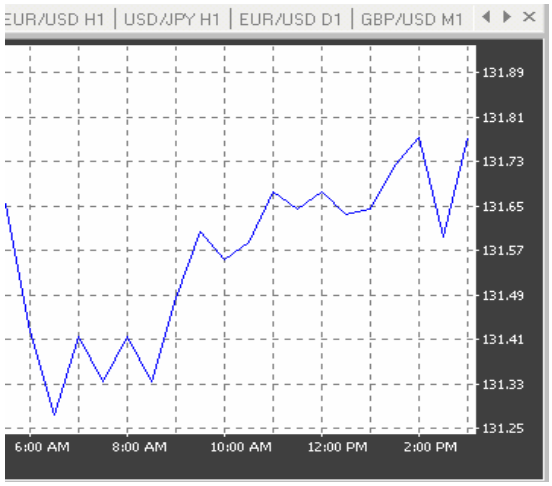

Figure 4.24. An example of a triple-bottom formation in the Japanese yen chart.

The head-and-shoulders, the double top and bottom and the triple top and bottom, due to their significance in trend reversals, are generally known as major reversal patterns.

Rounded Top, Rounded Bottom, Saucer, Inverted Saucer. Rounded Top (See Figure 4.25), Rounded Bottom (See Figure 4.26), Saucer (See Figure 4.27) and Inverted Saucer (See Figure 4.28) patterns form as a result of a slow and gradual change in the direction of the market. These patterns reflect the indecision of the market at the end of a trend. The trading activity is slow. It is impossible to know when the formation is indeed completed, and not for a lack of trying. Though is known that the longer it takes to complete patterns, the higher is the likelihood of a sharp price move in the new direction.

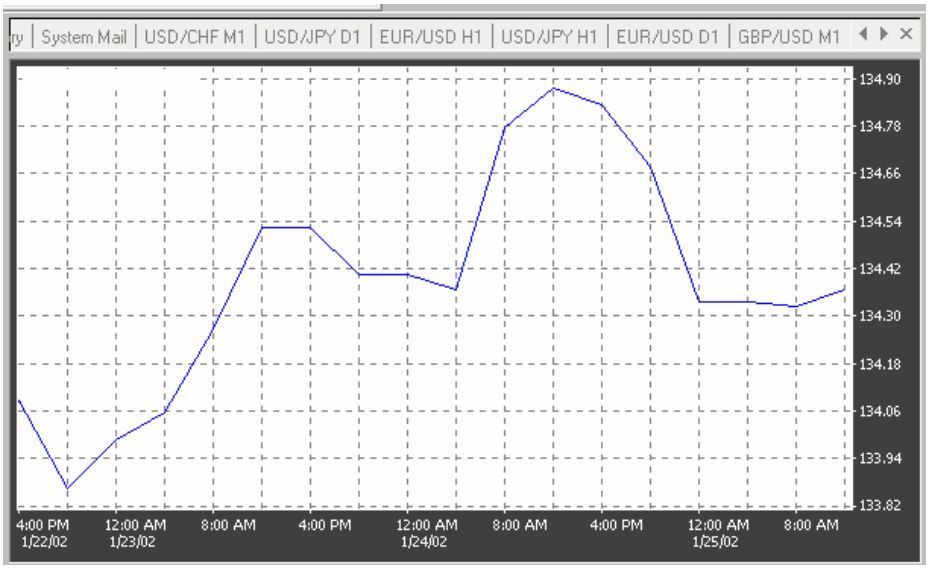

Figure 4.25. An example of a rounded top formation in the Japanese yen chart.

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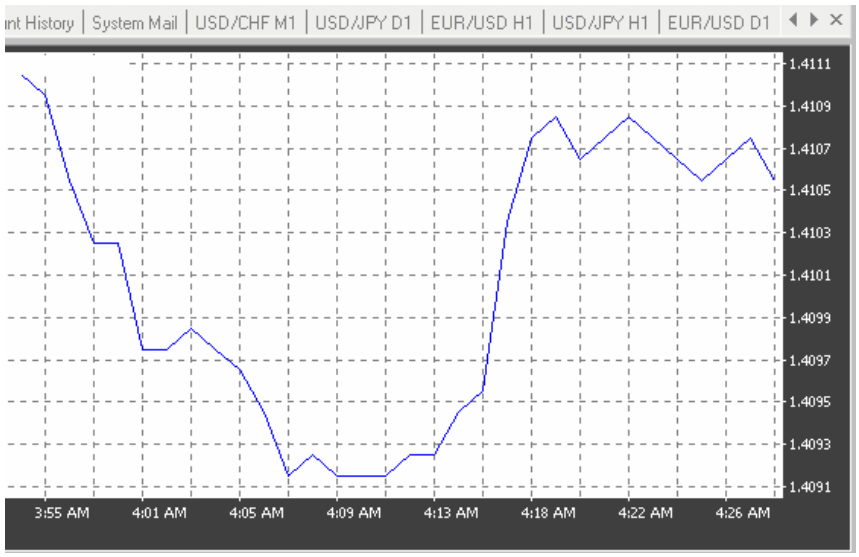

Figure 4.26. An example of a rounded bottom formation in the Pound Sterling chart.

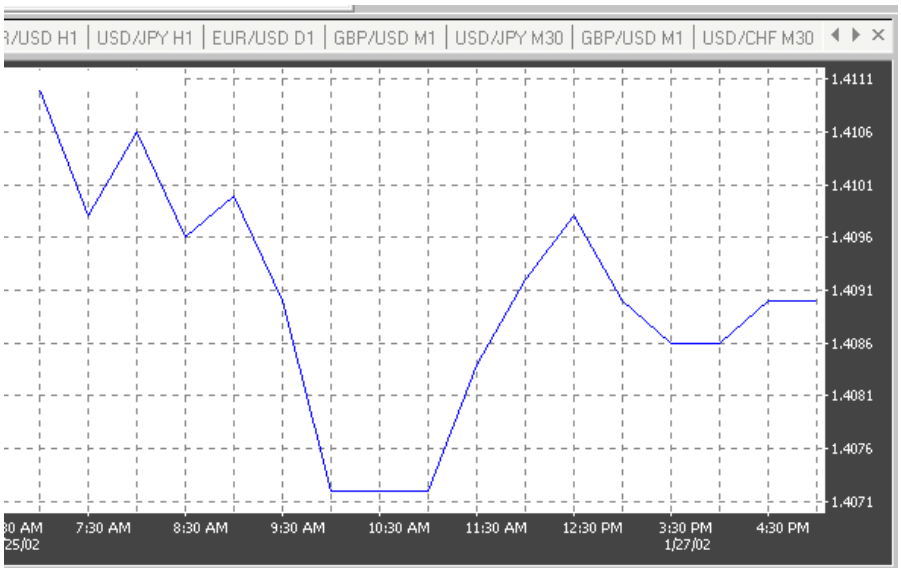

Figure 4.27. An example of a saucer formation in the Pound Sterling chart.

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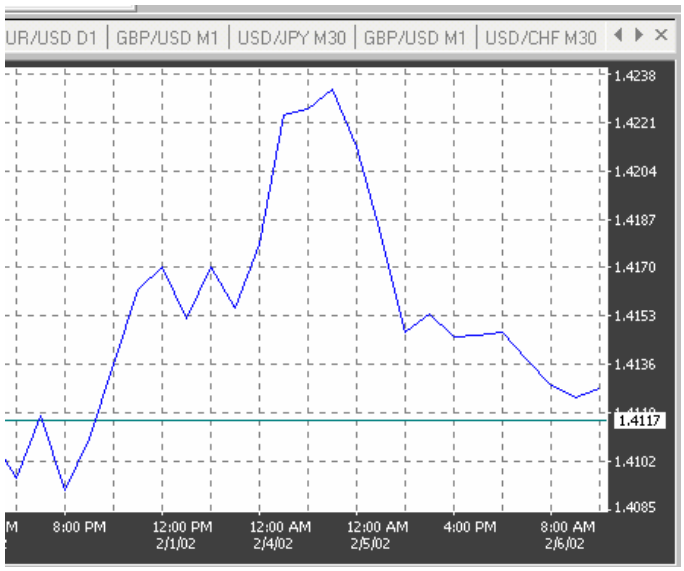

Figure 4.28. An example of an inverted saucer formation in the Pound Sterling chart.

4.5. Trend Continuation Patterns

Technical analysis provides charts that reinforce the current trends. These chart formations are known as *continuation patterns*. They consist of fairly short consolidation periods. The breakouts occur in the same direction as the original trend. The most important continuation patterns are:

1. Flags.
2. Pennants.
3. Triangles.
4. Wedges.
5. Rectangles.

Flags. The flag formation provides signals for direction and price objective. This formation represents a brief consolidation period within a solid and steep upward or downward trend. The consolidation itself is bordered by a support line and a resistance line, which are parallel to each other or very mildly converging, making it look like a flag (parallelogram) and tends to be sloped in the opposite direction from the slope of the original trend, or is simply flat. The previous sharp trend resembles a flagpole. If the original trend is going down, the formation is called a bearish flag (See Figures 4.29 and 4.30). As Figure 4.29 shows, the original trend is sharply down. The flagpole is measured between points *A* and *B*. The consolidation period occurs between the support line *BE* and the resistance line *CD*. When the price penetrates the support line at point *E*, the trend resumes its fall, with the price objective *F*, measured from *E*. The price target is of about equal with the flagpole's length *AB*, measured from the breakout point through the support line *BE*. Outgoing from prices in Figure 4.29, the height of the flagpole is measured as the difference between 140.00 - 120.00 = 20.00. Once the support line is broken at 125.00, the price target is 125.00 – 20.00 = 105.00.

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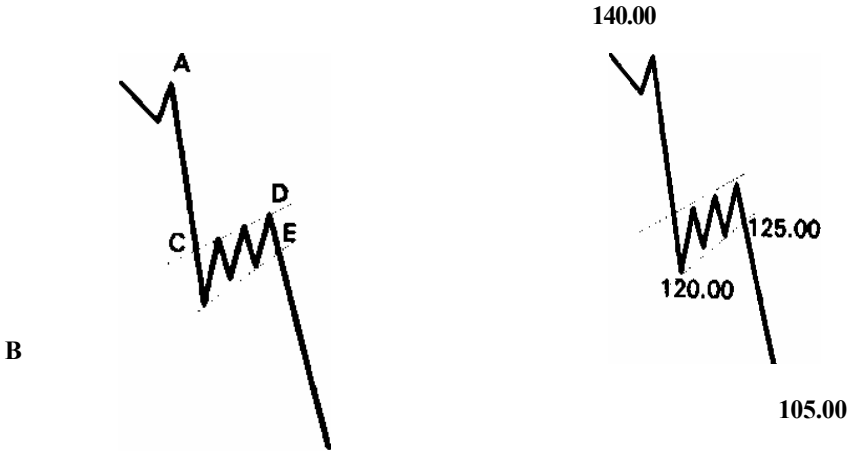

Figure 4.29. Diagrams of a bear flag formation.

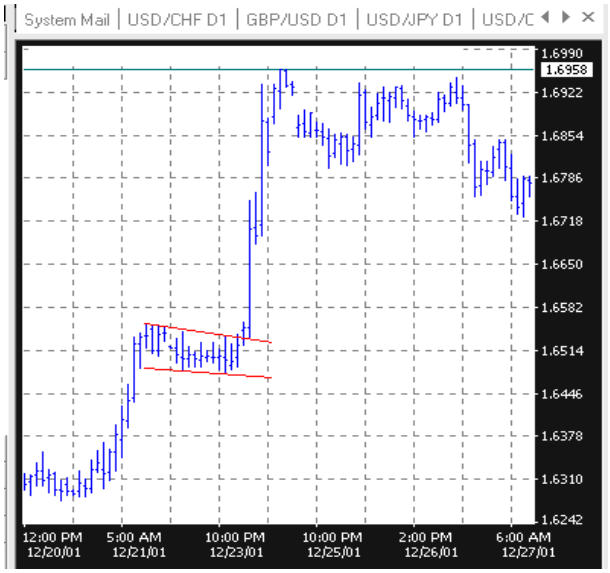

Figure 4.30. Example of bullish flags in the Swiss franc chart.

Pennants. The pennants are closely related to the flags, so the same principles apply. The sole difference is that the consolidation area better resembles a pennant, as the support and resistance lines converge. If the original trend is bullish, then the chart pattern is a bullish pennant. In Figure 4.31, the pennant pole is AB. C, B, and D frame the pennant-shaped consolidation. When the market breaks through the resistance line BD, the price objective is E. The amplitude of the target price is D to E, and it is equal to the pennant pole A to B. The price target measurement starts from the breakout point. Outgoing from prices in Figure 4.31, the height of the pennant pole is measured as the difference 1.5500 - 1.4500 = 1.1000. Once the resistance line is broken at 1.5200, the price target is 1.5200 +1.1000 = 1.6200.

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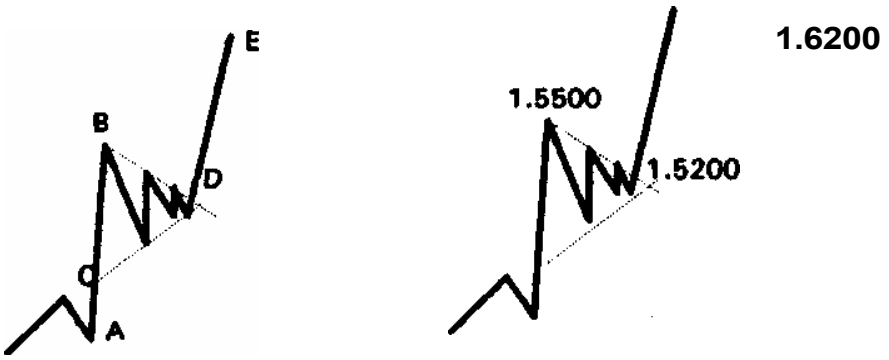

Figure 4.31. Diagrams of a bullish pennant.

If the original trend is going down, then the formation is a bearish pennant. In Figure 4.32, the pennant pole is *AB*. C, B and D frame the pennant-shaped consolidation. When the market breaks through the support line *BD*, the objective price is *E*. The amplitude of the target price is *DE*, and it is equal to the pennant pole *AB*. The price target measurement starts from the breakout point.

Outgoing from prices in Figure 4.32, the height of the flagpole is measured as the difference 139.00 - 119.00 = 20.00. Once the support line is broken at 120.00, the price target is 120.00 – 20.00 = 100.00.

A market example of a bearish pennant is presented on Figure 4.33.

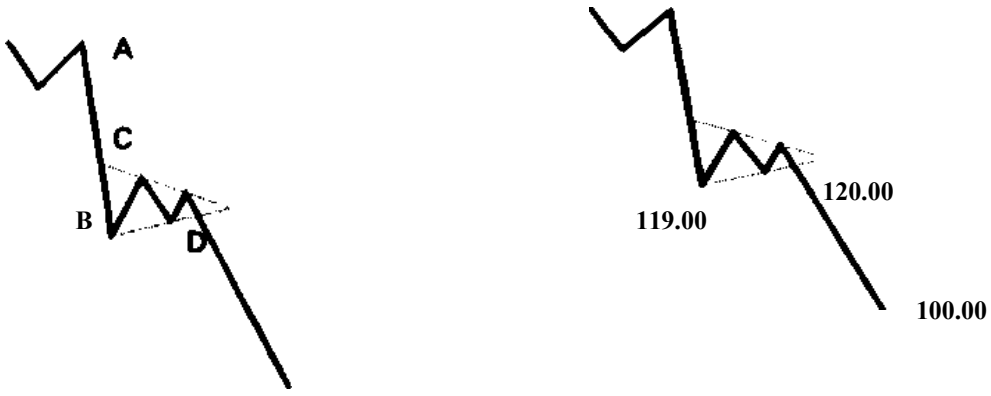

Figure 4.32. Diagrams of a bearish pennant.

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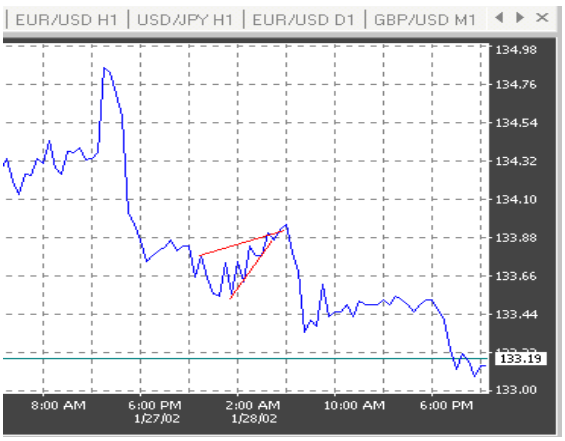

Figure 4.33. A real example of a bearish pennant in the Japanese yen chart.

Triangles. Triangles can be considered as pennants with no poles. There are four types of triangles: symmetrical, ascending, descending, and expanding (broadening.)

A symmetrical triangle consists of two symmetrically converging support and resistance lines, defined by at least four significant points (See Figures 4.34 and 4.35). The two symmetrically converging lines suggest that there is a balance between supply and demand in the foreign exchange market. Consequently, a break may occur on either side. Hence, in the case of a bullish symmetrical triangle, the breakout will likely occur in the same direction, qualifying the formation as a continuation pattern.

As Figure 4.34 shows, the converging lines are symmetrical. Points B, D, and F define the declining line. Points A, C, E, and G define the rising support line. The price target is either equal to the width of the base of the triangle BB', measured from the breakout point H (HH'); or at the intersection of line BI (which is a parallel line to the rising line AG) with the price line. Trading volume will visibly decrease toward the end of the triangle, suggesting the ambivalence of the market. The breakout is accompanied by a rise in volume.

Outgoing from prices in Figure 4.34, the price objective is either 1.5500, as the difference 1.5000 - 1.4000 = 0.1000 added to 1.4500; or 1.5300, as the difference between 1.5000 - 1.4000 = 0.1000, added to 1.4300. A currency market example is presented in Figure 4.35.

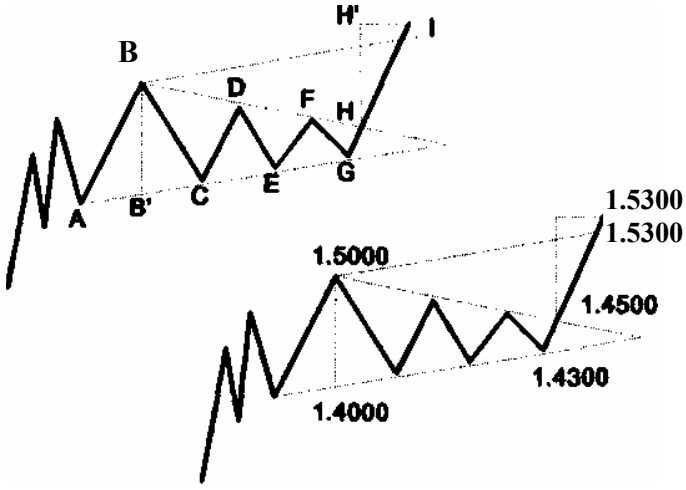

Figure 4.34. Diagrams of a bullish symmetrical triangle.

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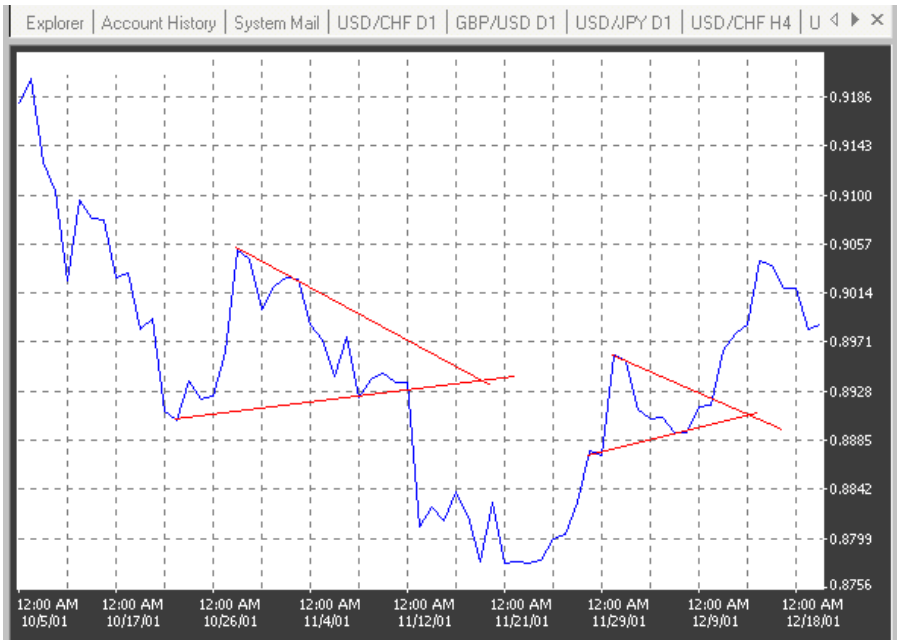

Figure 4.35. A real example of symmetrical triangles in the Euro chart.

From triangles of other kind the descending triangle is considered below. It consists of a flat support line and a downward sloping resistance line (See Figure 4.36). This pattern suggests that supply is larger than demand. The currency is expected to break on the downside. The descending triangle also provides a price objective. Measuring the width of the triangle base and then transposing it to the breakpoint calculate this objective. As shown in Figure 4.36, the support line, defined by points *A*, *C*, *E*, and *G*, is flat. The converging top line, defined by points *B*, *D*, *F*, and *H*, is sloped downward. The price objective is the width of the base of the triangle (*AA*'), measured above the support line from the breakout point I (*IF*.)

Outgoing from prices on Figure 4.36, the price objective is 1.3000, as the difference 1.5000 - 1.4000 = 0.1000 subtracted from 1.4000.

Trading volume is decreasing steadily toward the tip of the triangle, but increases rapidly on the breakout.

The *expanding (broadening) triangle*, or the *megaphone* consists of a horizontal mirror image of a triangle, where the tip of the triangle is next to the original trend, rather than its base (See Figure 4.37). Volume also follows the horizontal mirror image switch and increases steadily as the chart formation develops. As shown in Figure 4.37, the bottom support line, defined by points *B*, *D*, and *F*, and the top line, defined by points *A*, C, and *E*, are divergent. The price objective should be the width, *GG*', of the base of the triangle, measured from the breakout point *G*.

Outgoing from prices on Figure 4.37, the price objective is 102.00, as the difference between 101.00 - 100.00 = 1.00 subtracted from 101.00. A real example of the megaphone is shown in Figure 4.38.

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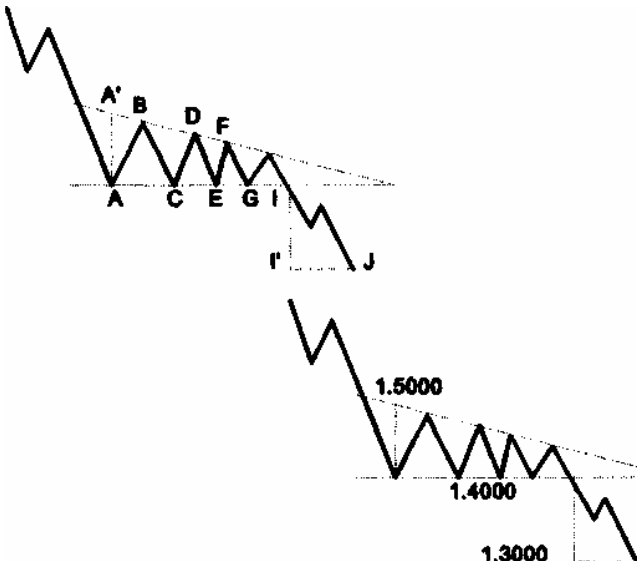

Figure 4.36. Diagrams of a descending triangle.

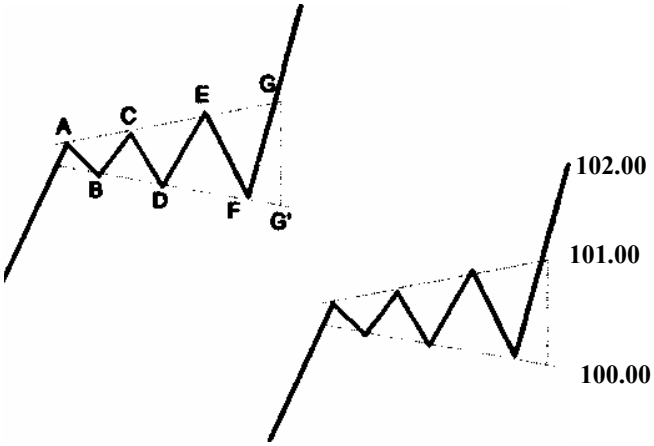

Figure 4.37. Diagrams of an expanding triangle.

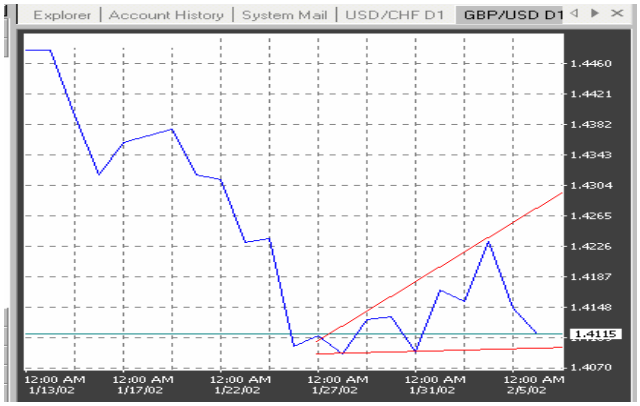

Figure 4.38. A real example of megaphone formation in the Pound Sterling chart.

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Wedges. The wedge formation is a close relative of the triangle and the pennant formations. It resembles both the shape and the development time of the triangles, but it really looks and behaves like a pennant without a pole. The wedge is markedly sloped, and the breakout occurs in the direction opposite to its slope (See Figures 4.39 and 4.40), but similar to the direction of the original trend. The signal we receive from the wedge formation is direction only. There is no reliable price objective. Depending on the trend direction, there are falling and rising types of wedges (as in Figure 4.39).

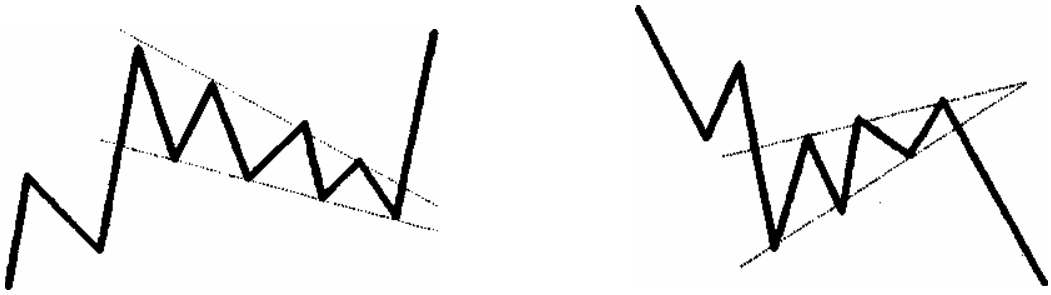

Figure 4.39. Diagrams of a falling (in a bullish trend) and a rising (in a bearish trend) wedges.

Figure 4.40. Example of a falling wedge in a bullish trend in the Japanese yen chart.

Rectangles . The rectangle formation reflects a consolidation period. Upon breakout, it is likely to continue the original trend. Its failure will change it from a continuation to a reversal pattern. This pattern is easy to spot, as it can be considered a minor side-ways trend.

If it occurs within an up-trend and the breakout occurs on the upside, it is called a bullish rectangle (See Figure 4.41). The price objective is the height of the rectangle. As Figure 5.56 shows, the currency moves between well-defined, flat support and resistance levels. A valid breakout may occur on either side from this consolidation period. The price target (GH) is equal to the height of the rectangle (G'H),

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measured from the breakout point H. Outgoing from prices in Figure 4.41, the price objective is 1.6200, as difference 1.6100 - 1.6000 = 0.0100, added to 1.6100.

If the consolidation occurs within a downtrend and the breakout continues the original trend, then it is called a bearish rectangle (See Figure 4.42). As shown in Figure 4.42, the currency moves between well-defined, flat support and resistance levels. A valid breakout may occur on either side of this consolidation on period. The price objective (HG') is equal in size to the height of the rectangle (GH), measured from the breakout point H. In the numerical example, the price objective is 100.00 (difference 102.00 - 101.00 = 1.00, subtracted from 101.00).

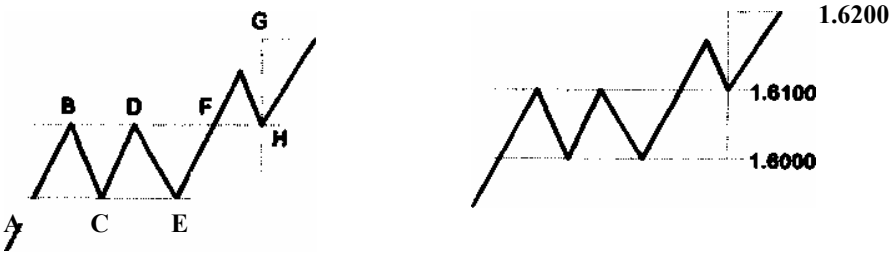

Figure 4.41. Diagrams of a typical bullish rectangle

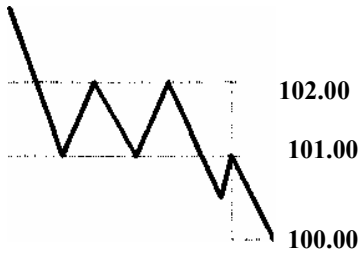

Figure 4. 42. Diagram of a typical bearish rectangle

Figure 4.43. Example of a bearish rectangle in the Euro chart.

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4.6. Gaps

Gaps in the technical analysis are named interruptions between *close* and *open* prices visualized in bar charts and candlesticks charts. Such a way, an opening outside the previous day's or other period's range generates a *price gap*. There are four types of gaps: *common, breakaway, runaway,* and *exhaustion*. It is commonly believed that "Gaps must *be filled."* as a result of the price reversal just after a gap formation. Hence, the time of gap filling may be essentially different for different types of gaps.

Common Gaps. Common gaps tend to occur in relatively quiet periods or in illiquid markets. Common gaps are as a rule short term that is it may soon close indeed. When gaps occur within regular trading ranges, the word on the street has been that, "Gaps must *be filled"*. Emerging of a common gap in a rise price chart is a signal *buy*, in a down price chart – *sell*. Examples of common gaps are shown on Figures 4.44 and 4.45. As one can see on these figures, the most gaps on charts were closed indeed in filling time up to 12 hours.

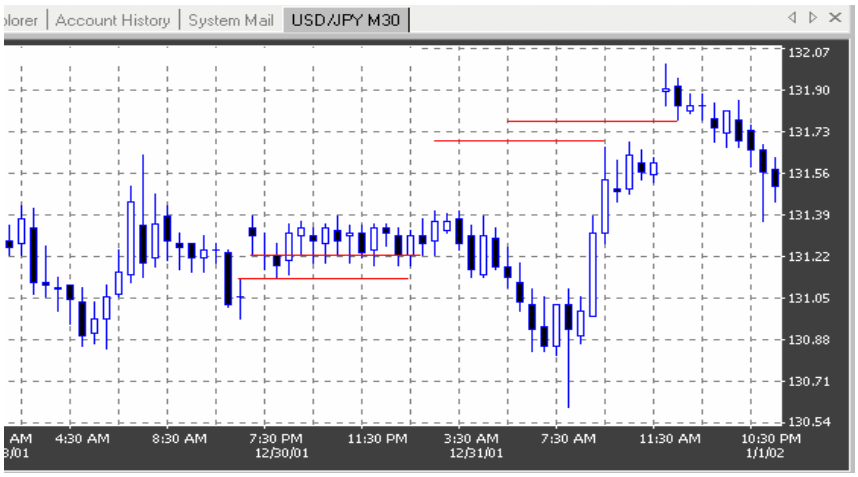

Figure 4.44. Example of common gaps filling in the Japanese yen chart.

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Breakaway Gaps. Breakaway gaps occur at the beginning of a new trend, usually after the break of a consolidation pattern. Breakaway gaps indicate most likely direction of the trend continuation and confirm a potential of the market. Examples of breakaway gaps are shown in the Figures 4.46 and 4.47.

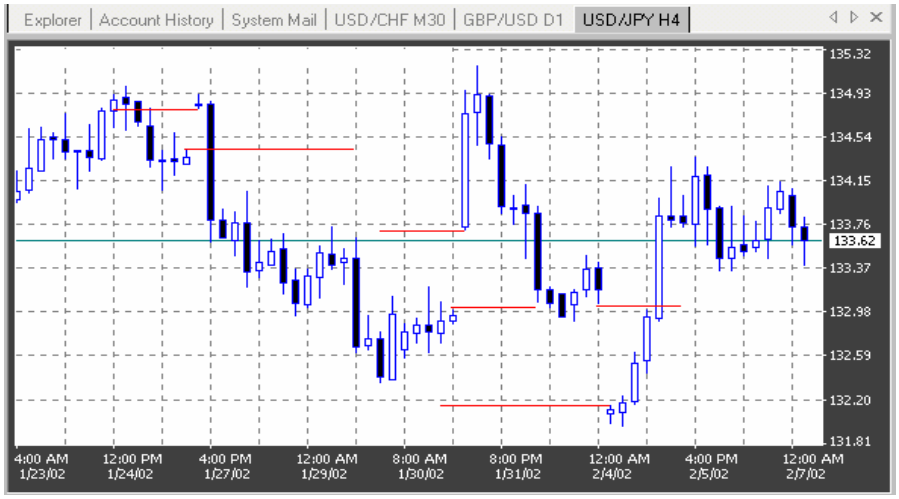

Figure 4.45. Example of common gaps in the Japanese yen chart.

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Figure 4.47. Example of a breakaway gap after a bullish wedge in the the Japanese yen chart.

Runaway Gaps. Runaway, or measurement gaps occur within solid trends, which develop fast. They are known as measurement gaps because they tend to occur about midway through the life of a trend. Thus, if you measure the total range of the previous trend and extrapolate it from the measurement gap, you can identify the end of the trend and your price objective. Since the velocity of the move should be similar on both sides of the gap, you also have a time frame for the duration of the trend. Examples of those gaps are shown on Figures 4.48 – 4.50.

Figure 4.47. Example of a breakaway gap after a bearish channel in f the Swiss franc chart.

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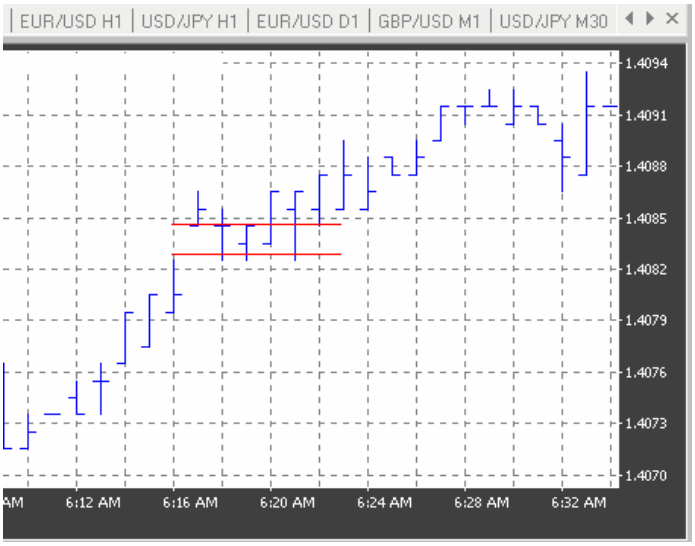

Figure 4.48. Example of a runaway gap in the Pound Sterling chart.

Exhaustion Gaps. Exhaustion gaps may occur at the top or bottom of a formation when trends change direction in an atypically quick manner. Gaps of that kind indicate on the direction of next movement of the market and reflect a sudden change in the demand-supply ratio. By a relatively slow reversal of the market you may wait on two exhaustion gaps to left and to right from a consolidation figure when so called exhaustion island is being formed.

Figure 4.49. Example of a runaway gap in the Pound Sterling chart.

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Figure 4.50. Example of a runaway gap in the Japanese Yen chart.

Real examples of an Exhaustion Gap and Exhaustion Island are shown on Figures 4.51 and 4.52.

Figure 4.51. Example of a exhaustion gap in the Pound Sterling chart.

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Figure 4.52. Example of an exhaustion island in the Japanese yen chart.

4.7. Mathematical tools for the technical analysis (Technical indicators)

The quantitative, or mathematical tools for the technical analysis called the *technical indicators* are being obtained as a result of the mathematical processing of prices averaged in time as well as other characteristics of market movements. They are applied to get signals for an additional evaluation of trade channels and patterns analysis by means of the indicators charts. The main groups of technical indicators are moving averages and oscillators.

Moving Averages. A moving average is an average price of a certain currency over a certain time interval (in days, hours, minutes etc) during an observation period divided by these time intervals. This averaged price is being determined consequently for each regular interval beginning from the first. A moving average has a smoother line than the underlying currency because statistical 'noises' are excluded to provide more convenient visualization of the currency activity. A moving average may be used as a special indicator or to create an *oscillator*. The moving average may be based on the midrange level or on a daily average of the high, low, and closing prices. The charts of moving averages are being plotted within same coordinates with an underlying price chart (See Figures 4.53 – 4.56).

In the technical analysis are known the next three types of moving averages:

1. The simple moving average or arithmetic mean (SMA).
2. The linearly weighted moving average (LMA). This type of average assigns more weight to the more recent closings. This is achieved by multiplying the last day's price by one, and each closer day by an increasing consecutive number. In our previous example, the fourth day's price is multiplied by 1, the third by 2, the second by 3, and the last one by 4; then the fourth day's price is deducted. The new sum is divided by 9, which is the sum of its multipliers.
3. The exponentially smoothed moving average (EMA) which provides the best smoothing of data averaged taking into account the previous price information of the underlying currency.

In Figure 4.53 is shown the difference in reading of different types of moving averages.

Trading signals of moving averages. Trade signals which occur by the use of one moving average is a *buy* signal by the crossing of the underlying price chart by the moving average chart

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from below up and a *sell* signal by the crossing of the underlying price chart by the moving average chart from above down (See Figure 4.54).

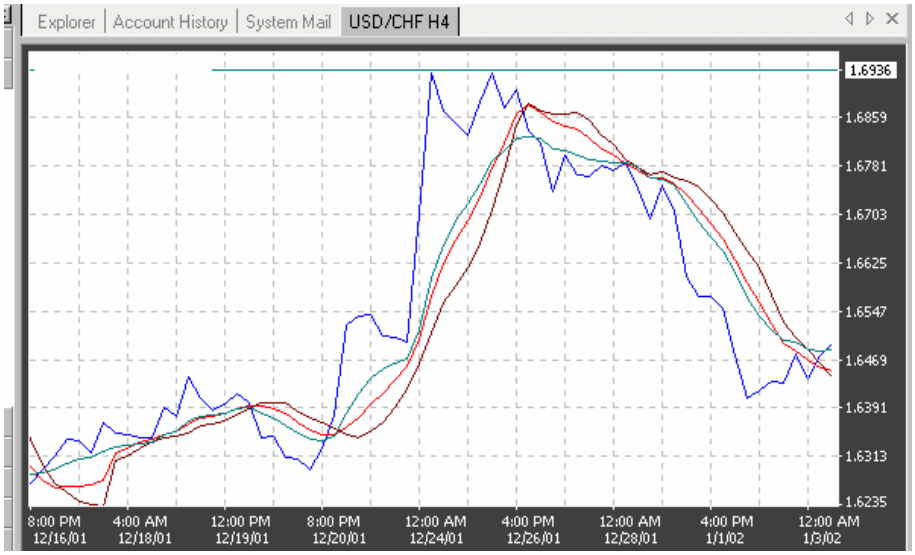

Figure 4.53. The underlying price chart (blue) and charts of a 9 days moving average (red – SMA, brown – LMA, green – EMA) in the Swiss franc chart.

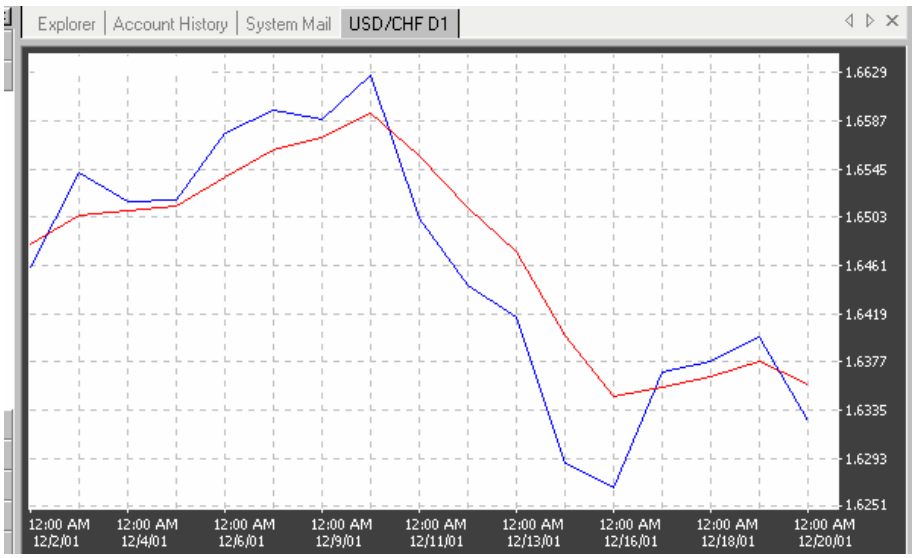

Figure 4.54. Trade signals (the underlying price chart – blue line, the moving average chart - red): the first and second crossing – signals *buy*, the third and forth – *sell*.

For the technical analysis applied are usually two or three moving averages charts constructed for different periods – long term, middle term and short term. For example to use two charts a combination of moving averages for 4 and 9 days and to use three moving averages – for 4, 9 and 18 days may be applied. Other often-applied combinations of three moving averages are 5, 20 and 60days and 7, 21 and 90 days.

A *buying signal* on a two-moving average combination, for example for 4 and 9 days, occurs when the shorter term of two consecutive averages (4 days) intersects the longer (9 days) upward. A *selling*

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signal occurs when the reverse happens, and the longer of two consecutive averages intersects the shorter one downward (See Figure 4.55).

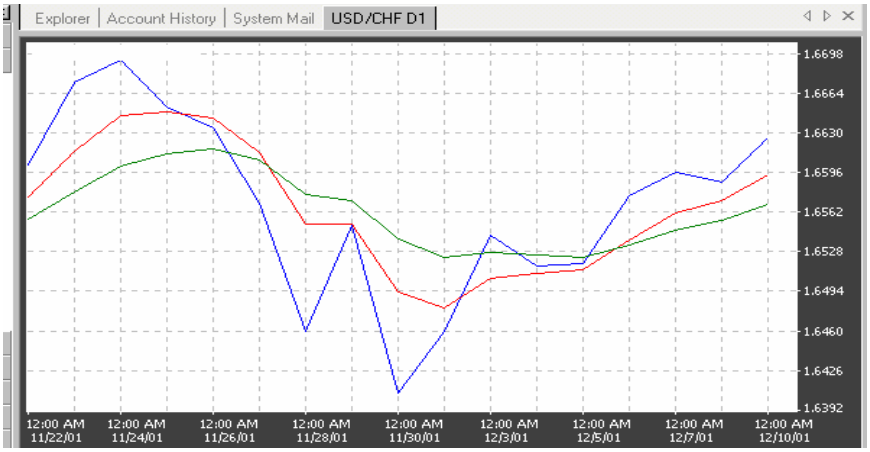

Figure 4.55. Trade signals (from left to right) by the use of two EMA in the Swiss franc chart (the underlying price chart – blue line, moving averages charts: red – for 4 days, green – for 9 days): the first crossing –*buy* signal, the second– *sell* signal

A signal involving three moving averages is generated by a moving averages combination of 4, 9, and 18 days. The *buying warning* occurs when the 4-day moving average crosses upward both the 9-day and 18-day averages, and the *buying signal* is confirmed when the 9-day moving average also crosses upward the 18-day average. (See Figure 4.56). The reverse is true for the selling signal.

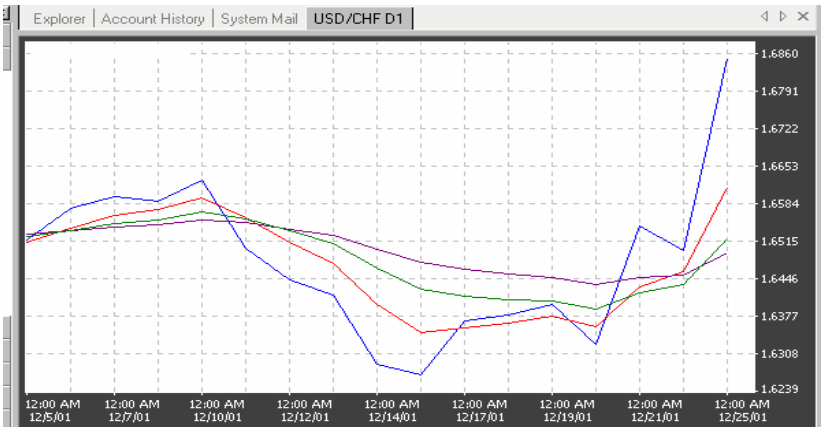

Figure 4.56. Trade signals (from left to right) by the use of three EMA in the Swiss franc chart (the underlying price chart – blue line, moving averages charts: red – for 4 days, green – for 9 days, brown – for 18 days): the first crossing –*buy* signal, the second– *sell* signal.

Envelopes. The envelope model consists of a short-term (perhaps 5-day) closing price based moving average to which you add and subtract a small percentage (2 percent is suggested for foreign currencies). An example for the envelope using the averaging along 14 days intervals is shown on the figure 4.57. The crossing of the underlying chart price by the envelope chart from above down is a buy signal.

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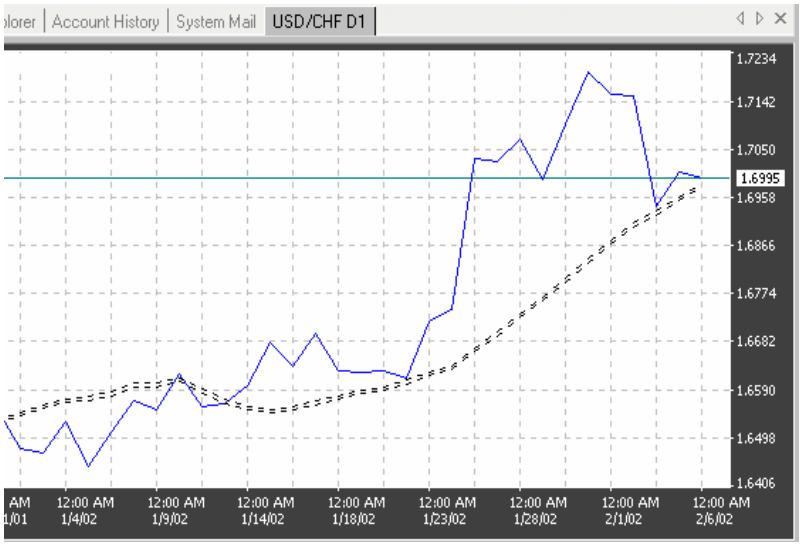

Figure 4.57. The underlying price (blue line) and the Envelop indicator (black lines) in the Swiss franc chart.

Ballinger Bands. The Ballinger bands combine a moving average with the instrument's volatility. The bands were designed to gauge whether prices are high or low on a relative basis via volatility. The two are plotted two standard deviations above and below a 20-day simple moving average.

The bands look a lot like an expanding and contracting envelope model. When the band contracts drastically, the signal is that volatility is low and thus likely to expand in the near future. An additional signal is a succession of two top formations, one outside the band followed by one inside. If it occurs above the band, it is a selling signal. When it occurs below the band, it is a buying signal (See Figure 4.58).

Median Price. The Median Price indicator chart is being plotted using arithmetical averages of high and low for a trade period prices. An example of that indicator is shown on Figure 4.59. The superposition of an underlying price chart with the indicator chart gives a visual representation about the grade and direction of the deviation of close prices from the averaged prices during an observation interval.

Average True Range. The indicator Average True Range denoted in the USA, as ATR is a grade of the volatility. Minimal and maximal values of the volatility are signals warning about a possible reversal.

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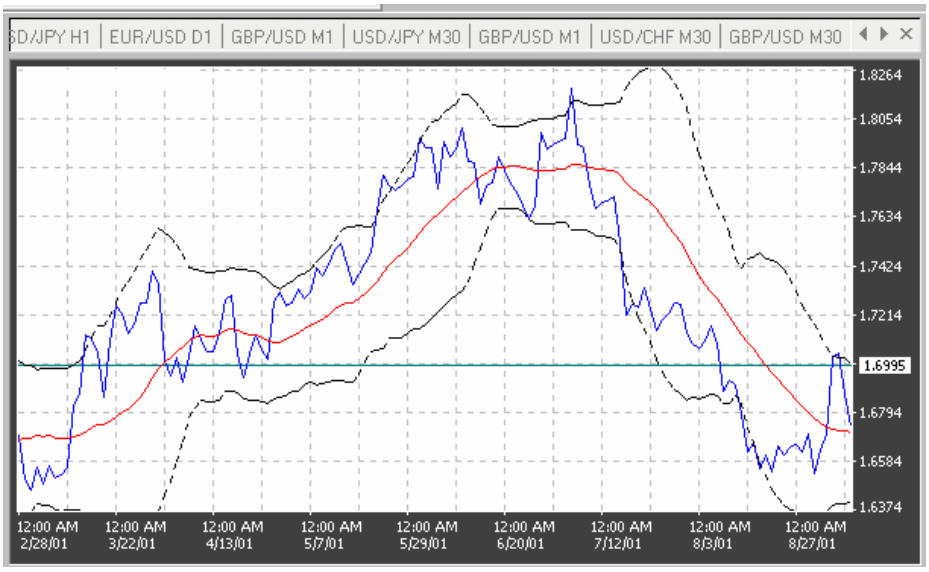

Figure 4.58. The underlying price (blue line), EMA (red line) and the Ballinger Bands indicator (black lines) in the Swiss franc chart.

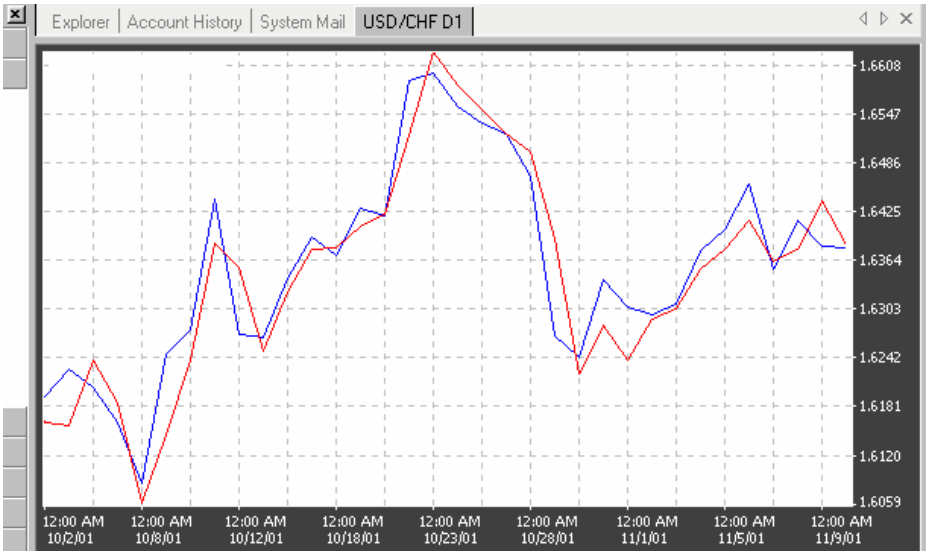

Figure 4.59. An example of the Median Price indicator (red line) in the Swiss franc chart.

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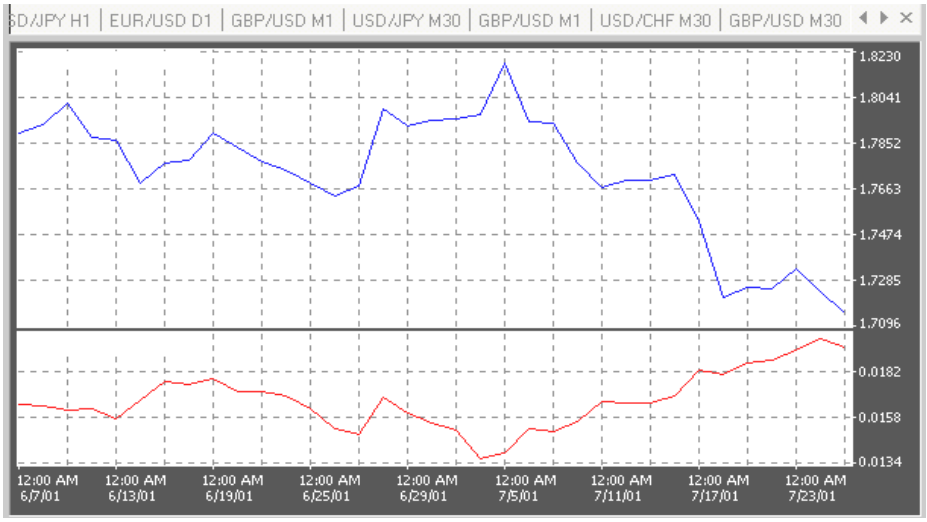

Figure 4.60. An example of the *ATR* indicator (red line) in the Swiss franc chart.

As it is shown in Figure 4.60 with an example of the *ATR* indicator for 14 days, declining of the volatility in the *ATR* chart till a minimal from all visible values was a prediction of the coming after it bearish price reversal.

Oscillators. Oscillators were designed to provide signals regarding *overbought* and *oversold* market conditions. Therefore the signals of oscillators are mostly useful at the extremes of their scales. Crossing the zero line, when applicable, usually generates direction signals. The major types of oscillators provided by the *RoyalForex* program are considered below.

Commodity Channel Index. The commodity channel index (*CCI*) consists of the difference between the mean price of the currency and the average of the mean price over a predetermined period of time. A buying signal is generated when the price exceeds the upper (+100) line, and a selling signal occurs when the price dips under the lower (-100). An example of this indicator is shown in Figure 4.61. As one can see in this Figure, the *CCI* oscillates around 0 in the interval from -100 till +100. Values *CCI*>100 tells about an *overbought* (position *sell* likes to be rational), a value *CCI*<100 is a feature of an oversold (position *buy* likes to be rational).

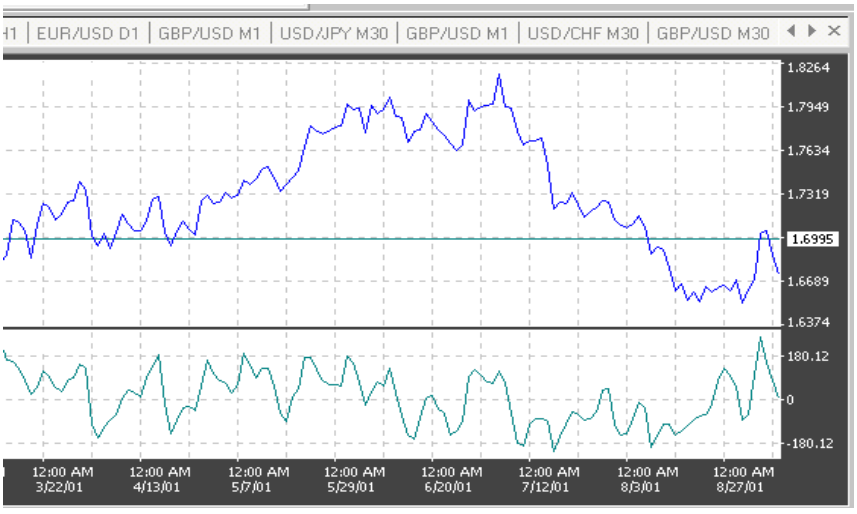

Figure 4.61. Example of a real *CCI* indicator chart in the Swiss franc chart.

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Directional Movement Index. The directional movement index (shortly – DMI) provides a signal of a clear trend presence in the market. The line simply rates the price directional movement on a scale of 0 to 100%. The higher the number, the better the trend potential of a movement, and vice versa. An example of the DMI indicator for 14 days is presented in Figure 4.62.

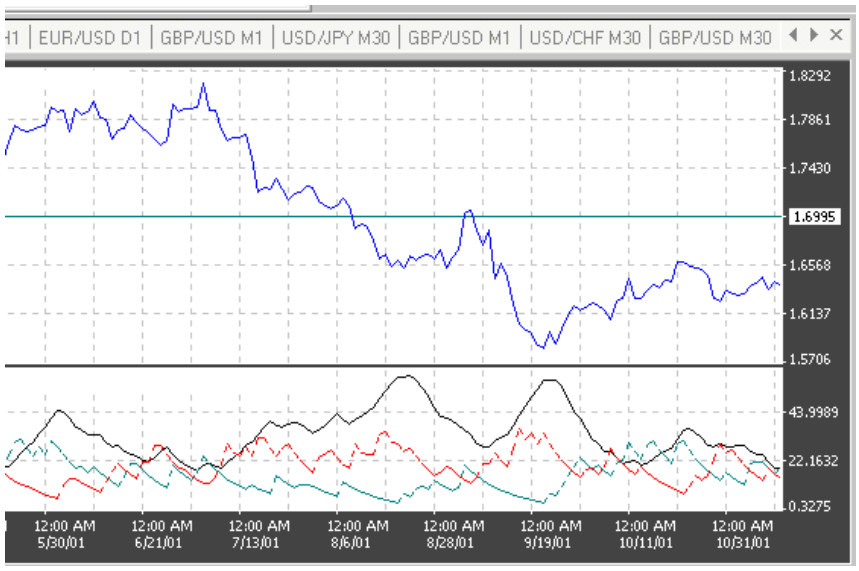

Figure 4.62. Example of a real *DMI* indicator chart in the Swiss franc chart.

To construct a DMI indicator chart two lines are to be generated which measure the buying and selling pressure. They are called +DI (that is the positive directional indicator which is shown in Figure 4.62 by the green line) and-DI (that is the positive directional indicator which is shown in Figure 4.62 by the black line). If +DI line is higher than –DI, a bullish situation exists, otherwise – a bearish as in Figure 4.62. Lines +DI and -DI are a ground to create the third one – so called directional movement line (*ADX*). The latter oscillates in limits from 0 till 50. Values of the ADX below 20 correspond to the absence of any clear trend in the market. A rise of the ADX above 20 is a signal warning about the beginning of a trend formation. An ADX line, which was above 40 and is going to fall down signals about an exhaustion of the trend.

Stochastic. Stochastic generate trading signals before they appear in the price itself. The stochastic concept is based observations that, as the market gets toppish, the closing prices tend to approach the daily highs; whereas in a bottoming market, the closing prices tend to draw near the daily lows.

This oscillator consists of two lines called %K and %D. Visualize %K as the plotted instrument, and %D as it's moving average.

The formulas for calculating the stochastic are:

%K = *[(CCL -L9)I(H9 -L9)]* * 100,

Where

CCL - current closing price;

*L*9 - the lowest low of the past 9 trade periods;

*H*9 - the highest high of the past 9 trade periods

and

***%D*=(*H3/L3)* * 100,**

where

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***H3 = CCL – L3*;**
***L3= H3 – L3*.**

The resulting lines are plotted on a 1 to 100 scale, with overbought and oversold warning signals at 70% and 30%, respectively. The buying (bullish reversal) signals occur under 10%, and conversely the selling (bearish reversal) signals come into play above 90% after the currency turns. (See Figure 5.67.) In addition to these signals, the oscillator-currency price divergence generates significant signals. A real example of a stochastic oscillator is presented in Figure 4.63.

The intersection of the %D and %K lines generates further trading signals. There are two types of intersections between the %D and %K lines:

1. The *left crossing,* when the %K line crosses prior to the peak of the %D line.
2. The *right crossing,* when the %K line occurs after the peak of the %D line.

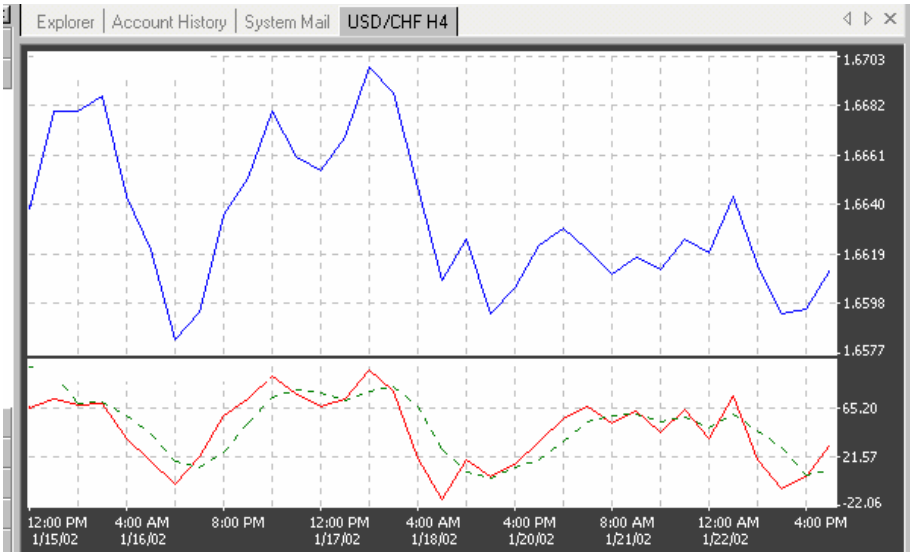

Figure 4.63. Example of the stochastic indicator in the Swiss franc chart: red line - %*K*, green - %*D*.

Convergence – Divergence of Moving Averages. The moving average convergence-divergence (MACD) oscillator is built on exponentially smoothed moving aver ages. The MACD is a combination of charts (1) of the difference of two EMA (a short and a long ones) and (2) of "the shortest" EMA which all are plotted against the zero line. The zero line represents the times the values of the two moving averages are identical. A real example of the MACD indicator is shown in Figure 4.64.

In addition to the signals generated by the averages' intersection with the zero line and by divergence, additional signals occur as the shorter average line intersects the longer average line. The buying signal is displayed by an upward crossover, and the selling signal by a downward crossover (See Figure 4.64).

Momentum. Momentum is an oscillator designed to measure the rate of price change. This oscillator consists of the net difference between the current closing price and the oldest closing price from a predetermined period.

The formula for calculating the momentum (*M*) is:

M=CCP-OCP,

Where

CCP - current *close* price;

OCP – the oldest *close* price for the predetermined period.

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The new values thus obtained will be either positive or negative numbers, and they will be plotted around the zero line. In the program RoyalForex the algebraic addition of the difference obtained with the figure 100 is being performed and a real indicator outputted from this program oscillates around the 100 line. At values of the momentum M>100 one says "The market caught a moment", otherwise (M<100)"The market lost a moment". A real example of the Momentum indicator for 14 days is shown in Figure 4.65. Maximal values of the indicator show the overbought, minimal – oversold market conditions. In terms of time frame, needless to say, the shorter the number of days included in the calculations, the more responsive the momentum will be to short-term fluctuations, and vice versa.

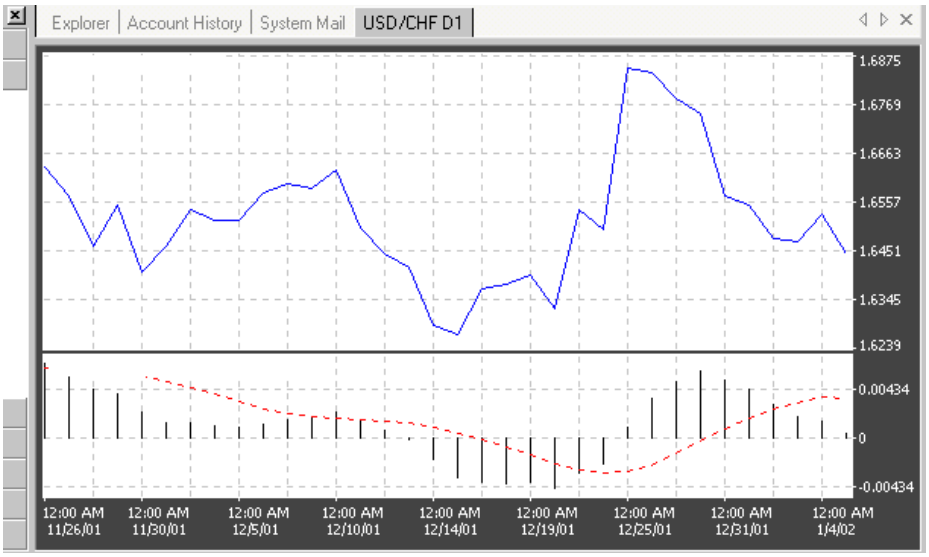

Figure 4.64. Example of a real *MACD* indicator chart in the Swiss Franc chart.

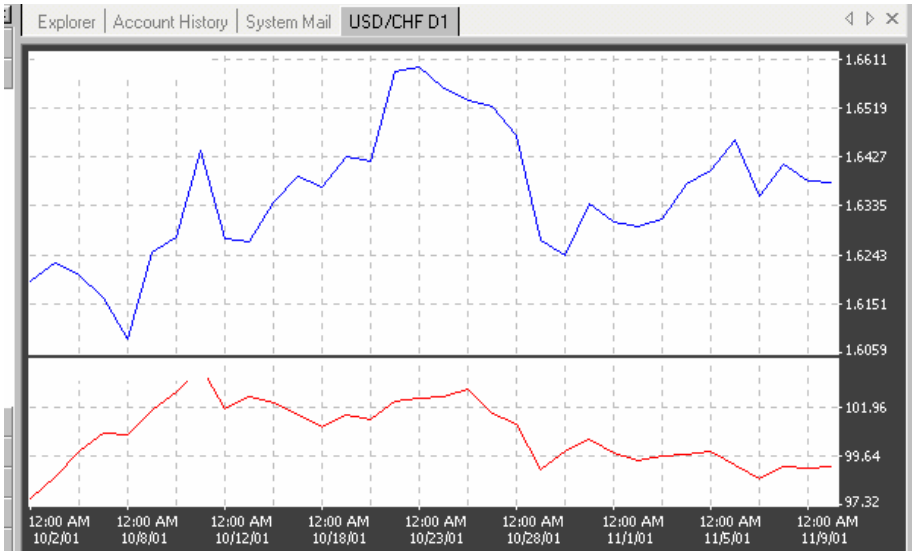

Figure 4.65. Example of a real *Momentum* indicator chart in the the Swiss franc chart.

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Relative Strength Index. The Relative Strength Index (shortly called as RSI) measures the relative changes between the highest and lowest close prices (See Figure 4.66).

The formula for calculating the RSI is:

RSI=100-[100/(1+RS)],

Where

RS - average of predetermined number *X* trade periods value of all *close*s, which were higher than all preceded closes divided by average of the same *X* priodss value of all closes, which were lower than all preceded closes.

Most often RSI is calculated for 14 days. RSI charts are plotted on a 0 to 100% scale. The 70% and 30% values are used as warning signals, whereas values above 85% indicate an overbought condition (sell signal) and values under 15 indicate an oversold condition (buy signal). By the technical analysis RSI is effectively used together with Ballinger Bands. It is believed that a sell position should be open when by a high RSI value the price chart touches with the upper Ballinger Band, and a buy position – when by a low RSI value the price chart touches with the bottom band. A real example of an RSI indicator for 14 days together with the Ballinger Bands indicator is shown in Figure 4.66.

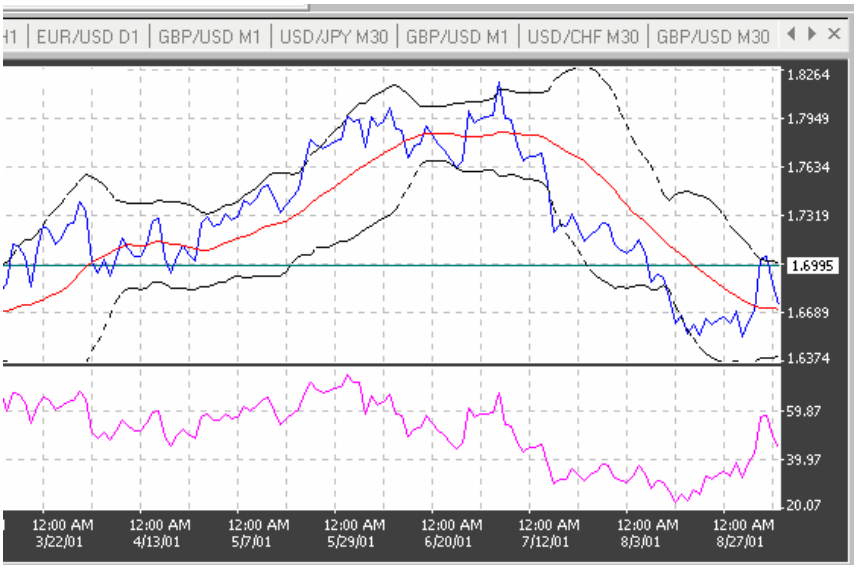

Figure 4.66. Example of real *RSI* and *Ballinger Band* indicators in the Swiss Franc chart

Rate of Change. The Rate of Change (shortly – ROC) is another version of the Momentum oscillator. The difference consists in the fact that, while the Momentum's formula is based on subtracting the oldest close price from the most recent, and the ROC's formula is based on dividing the oldest close price into the most recent one:

ROC = (CCP/OCP) * 100,

Where

CCP - current *close*;

OCP – the oldest *close* price for the predetermined period.

A real example of the ROC for 14 days is shown in Figure 4.67.

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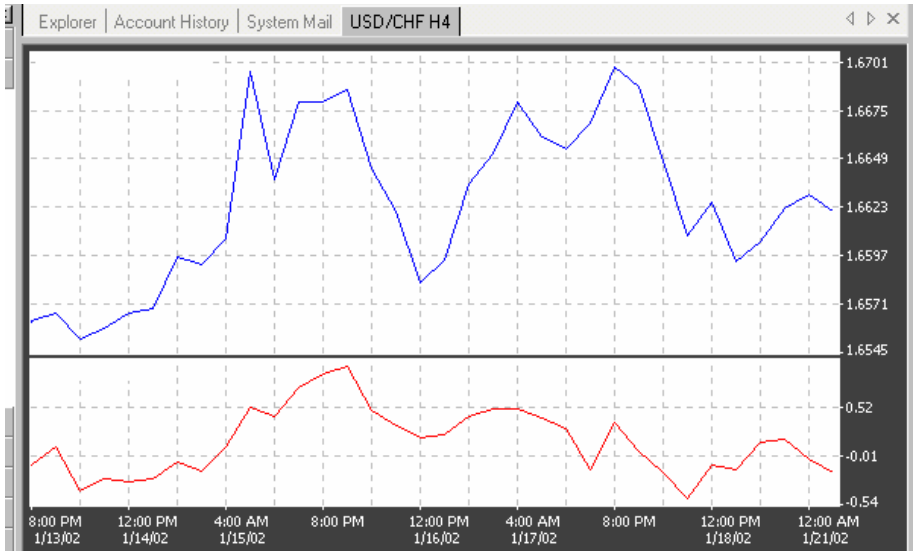

Figure 4.67. Example of a real *ROC* indicator on the f the Swiss Franc chart.

Larry Williams Percent Rate. The Larry Williams Percent Rate (Williams %R) is a version of the stochastic oscillator. It consists of the difference between the highest high price of a predetermined number of days and the current close price, which difference in turn is divided by the total range. This oscillator is plotted on a reversed 0 to 100% scale (See a real example in Figure 4.68). Therefore, the bullish reversal signals occur at fewer than 80%, and the bearish signals appear at above 20%. The interpretations are similar to those discussed under stochastic.

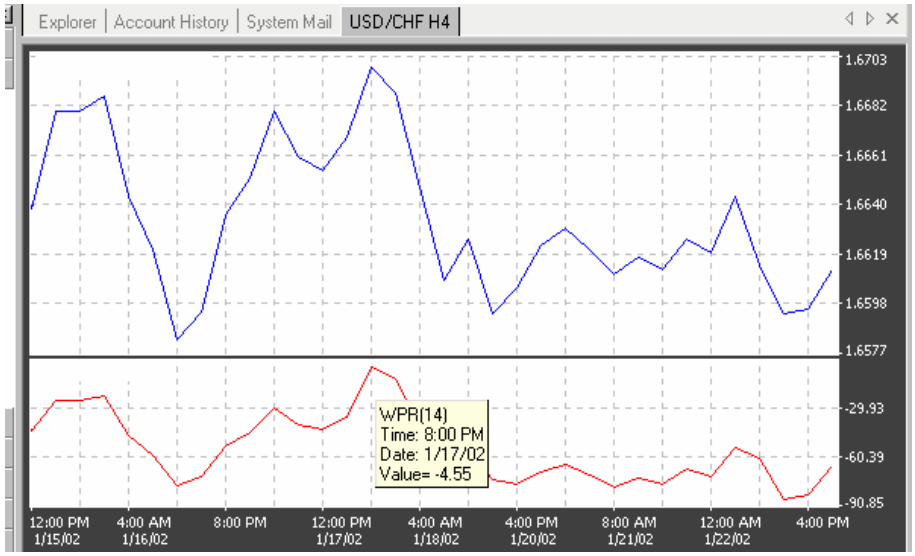

Figure 4.68. Example of a real *W%R* indicator on the of the Swiss Franc chart.

It is rational to use for a detailed technical analysis a combination of different indicators from the above mentioned (See Figure 4.69).

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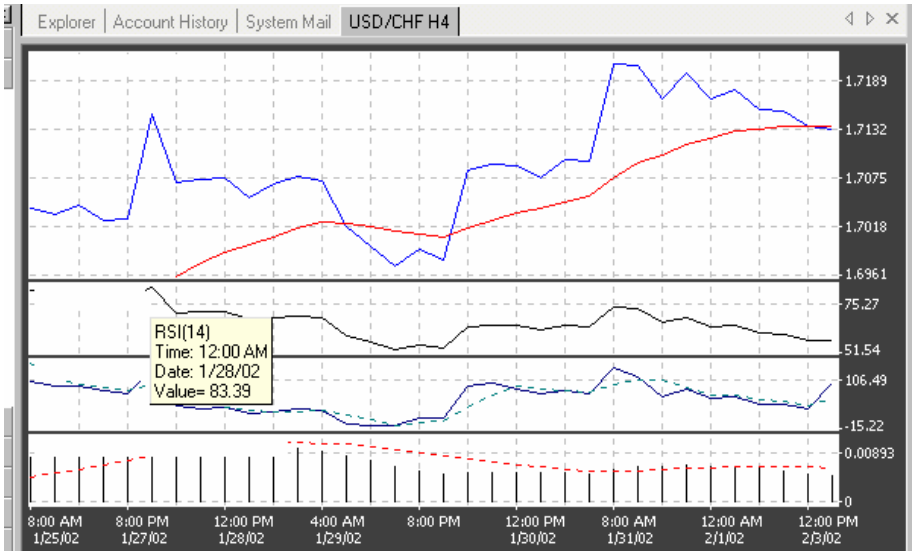

Figure 4.69. Example of the technical indicators combination indicator in the Swiss Franc chart: *EMA* (red line in the price chart), *RSI* (the upper indicator), *Stochastic* (the middle indicator) and MACD (the bottom indicator).

Ichimoku Kinko Hyo. The Ichimoku Kinko Hyo (or simply - Ichimoku) indicator is appointed to determine simultaneously a market trend direction, support and resistance levels and to trigger *buy* and *sell* signals. Such a way, this indicator unites in itself a number of other indicators as well as different approaches concerning with the price movement prediction. To construct an Ichimoku's chart four time intervals of different widths are used. On those intervals are grounded values of the following lines constituting the Ichimoku which are the lines of median prices in a corresponding interval:

Tenkan-sen – shows the average value of a price of the first time interval which is the sum of a maximum and minimum of that time, divided by two;

Kijun-sen - shows the average value of a price of the second time interval;

Senkou Span A – shows the middle of a distance between two preceding lines moved ahead on the value equal the second time interval;

Senkou Span B - shows the average value of a price of the third time interval moved ahead on the value equal the second time interval;

Chinkou Span - shows the *close* of a current candlestick moved back on the value equal the second time interval.

The area between *Senkou* lines is hatched and called *the cloud*. If the price chart is inside the cloud the market is believed trendless, and *Senkou* lines form support and resistance levels.

If the price chart is above the cloud, the upper cloud border is the first support and the bottom – the second. If the price chart is under the cloud then the bottom cloud border is the first resistance and the upper – the second. The crossing of the price chart by the line *Chinkou Span* bottom-up is a *buy* – signal, top-down - *sell*. *Kijun-sen* («main line») is used as a gauge of the market movement. If the price is above this line, a growth of prices is to be expected. If the prices cross this line the further trend reversal is likely to be expected. The other variant of the

Kijun-sen use is trade signals triggering. A signal *buy* is generated if the *Tenkan-sen* line crosses the *Kijun-sen* line bottom-up and signal *sell* – by crossing otherwise. The *Tenkan-sen*

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("reversal line") is being used as an indicator of the market trend – a trend exists if this line is rising or falling. A real example of the Ichimoku is presented in Figure 4.70.

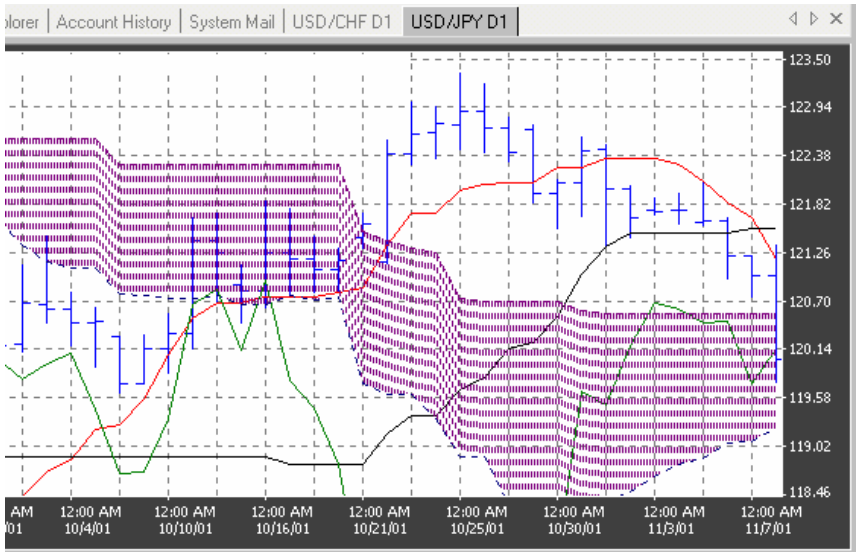

Figure 4.70. Example of the *Ichimoku* indicator with lines *Tenkan-sen* (of 9 days, red), *Kijun-sen* (of 26 days, black), *Senkou Span B* and *A* (of 52 days, the cloud's color), *Chinkou Span* (of 26 days, green) in the Japanese yen chart. The trade signals *buy* and *sell* are in points of crossing of black and green lines by the red line bottom-up and top-down.

The additional information with regard to technical indicators is represented under the menu "Additional Materials" of this Web site.

5. Fibonacci constants and Elliott waves theory

5.1 Fibonacci constants

The Fibonacci theory named so after a prominent Italian mathematician of the late twelfth and early thirteenth centuries gives ratios, which play important role in the forecasting of market movements. Fibonacci introduced an additive numerical series that has come to be called the *Fibonacci sequence, which* consists of following series of numbers:

1,1,2,3,5,8,13,21,34,55,89,144,233,377,610,987,1597,2584,4181, (etc.).

These numbers exhibit several remarkable relationships, in particular the ratio of any term in the series to the next higher term. This ratio tends asymptotically to 0.618. In addition, the ratio of any term to the next lower term in the sequence tends asymptotically to 1.618, which is the inverse of 0.618. Similarly constant ratios exist between numbers two terms apart, three terms apart, and so on. The ratio 0.618, referred to as the Fibonacci ratio, or the "Gold Spiral" which is being observed in structures of many natural objects and events – from clam's construction till the form of whirlwinds and hurricanes.

The financial markets exhibit Fibonacci proportions in a number of ways; particularly they are powerful tools for calculating price targets and placing stops. For example, if a corrective wave is expected to retrace 61.8 percent of the preceding impulse wave, an investor might place a stop slightly below that level. This will ensure that if the correction is of a larger degree of trend than expected, the investor

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will not be exposed to excessive losses. On the other hand, if the correction ends near the target level, this outcome will increase the probability that the investor's preferred wave interpretation is accurate (See also p. 4.1).

5.2 Elliott waves theory

The Elliott Waves Principle is a system of empirically derived rules about the amount of ascending and descending waves during the history of a market movement. This theory postulates that all the market movement consists of cycles containing 8 waves each including five waves in the direction of the trend at one larger scale and three waves against that trend. In a rising market, this five wave/three-wave pattern forms one complete bull market/bear market cycle of eight waves. The five-wave upward movement as a whole is referred to as an *impulse wave* with sub waves labeled with figures while the three-wave countertrend movement is described as a *corrective wave* with sub waves labeled with letters (See Figure 5.1). Amplitudes of the correction waves subordinate certain rules: a second wave may never retrace more than 100 percent of a first wave (for example, in a bull market, the low of the second wave may not go below the beginning of the first wave); the third wave is never the shortest wave in an impulse sequence, often, it is the longest; a fourth wave can never enter the price range of a first wave (See Figure 5.2) As the illustration shows, waves of any degree in any series can be subdivided and resubdivided into waves of smaller degree or expanded into waves of larger degree. Furthermore, smaller-scale movements link up to create larger-scale movements possessing the same basic form. Conversely, large-scale movements consist of smaller-scale subdivisions with which they share a geometric similarity. Because these movements link up in increments of five waves and three waves, they generate sequences of numbers that the analyst can use (along with the rules of wave formation) to help identify the current state of pattern development, as shown in Figure 5.3.

Extentions. In any given five-wave sequence, a tendency exists for one of the three impulse sub waves (i.e., wave 1, wave 3, or wave 5) to be an *extension*—an elongated movement, usually with internal subdivisions. At times, these subdivisions are of nearly the same amplitude and duration as the larger degree waves of the main impulse sequence, giving a total count of nine waves of similar size rather than the normal count of five for the main sequence (See Figure 5.4). Extensions can provide a useful guide to the lengths of future waves. Most impulse sequences contain extensions in only one of their three impulsive sub waves. Thus, if the first and third waves are of about the same magnitude, the fifth wave probably will be extended, especially if volume during the fifth wave is greater than during the third.

Diagonal Triangles. There are certain patterns resembling known from the technical analysis theory including two types of triangles, which are to be considered from the Elliott theory position.
The diagonal triangle type 1 occurs only in fifth waves and in C waves, and it signals that the preceding move has "gone too far, too fast," as Elliott put it. Essentially a rising wedge formation defined by two converging trend lines, type 1 diagonal triangles indicate exhaustion of the larger movement. Unlike other impulse waves, all of the patterns' sub-waves, including waves 1, 3, and *5,* consist of three-wave movements, and their fourth waves often enter the price range of their first waves, as shown in Figures 5.5 and 5.6. A rising diagonal triangle type 1 is bearish, because it is usually followed by a sharp decline, at least to the level where the formation began. In contrast, a falling diagonal type 1 is bullish, because an upward thrust usually follows.

The *diagonal triangle type 2* occurs even more rarely than type 1. This pattern, found in first-wave or A-wave positions in very rare cases, re sembles a diagonal type 1 in that it is defined by converging trend lines and its first wave and fourth wave overlap, as shown in Figure 5.7. However, it differs significantly from type 1 in that its impulsive sub waves (waves 1, 3, and 5) are normal, five-wave impulse waves, in contrast to the three-wave sub waves of type 1. This is consistent with the message of the type 2

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diagonal triangle, which signals continuation of the underlying trend, in contrast to the type 1 's message of termination of the larger trend.

Failures (Truncated Fifths). Elliott used the *word failure* to describe an impulse pattern in which the extreme of the fifth wave fails to exceed the extreme of the third wave. Figures 5.8 and 5.9 show examples of failures in bull and bear markets. As the illustrations show, the truncated fifth wave contains the necessary impulsive (i.e., five-wave) substructure to complete the larger movement. However, its failure to surpass the previous impulse wave's extreme signals weakness in the underlying trend, and a *sharp* reversal usually follows.

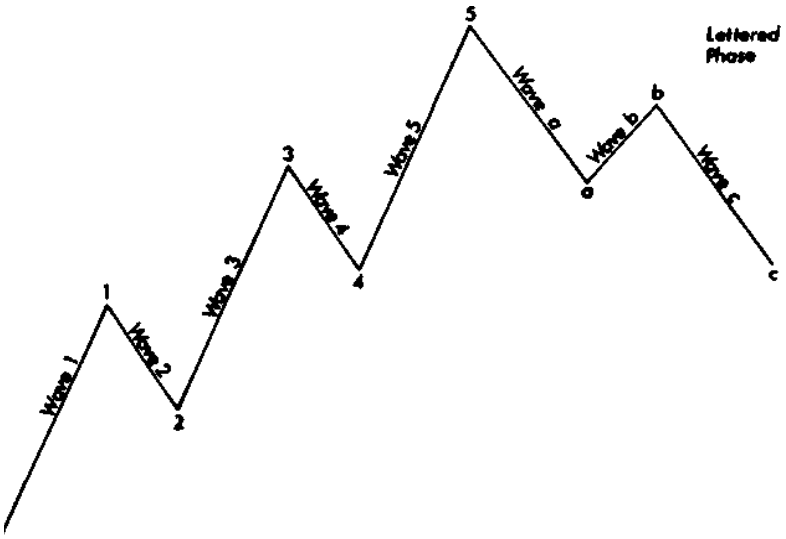

Figure 5.1. Diagram of the basic Elliott Wave.

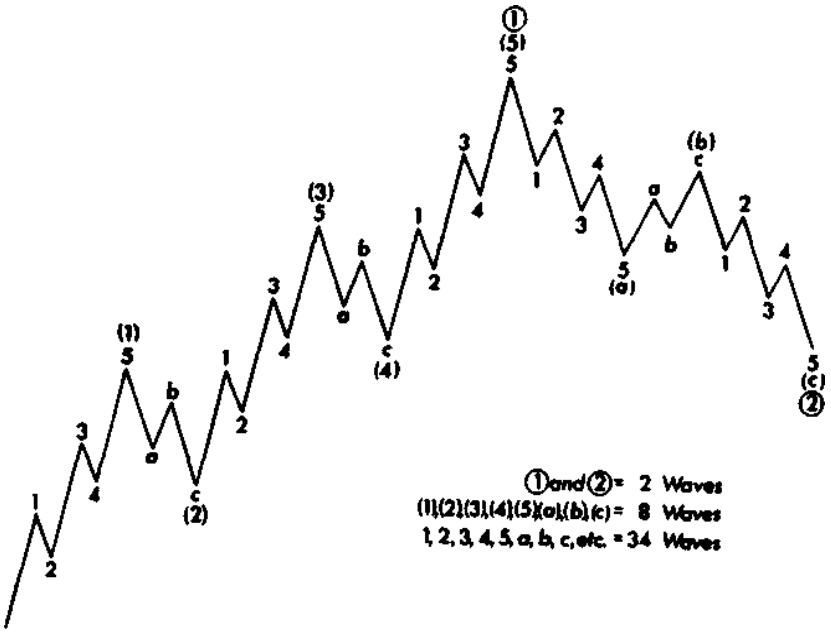

Figure 5.2. The larger scale pattern of the Elliott wave.

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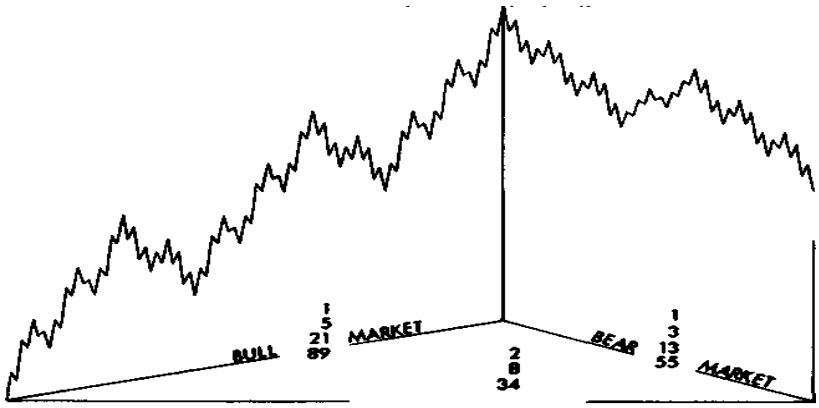

Figure 5.3. Diagram of a complete market cycle.

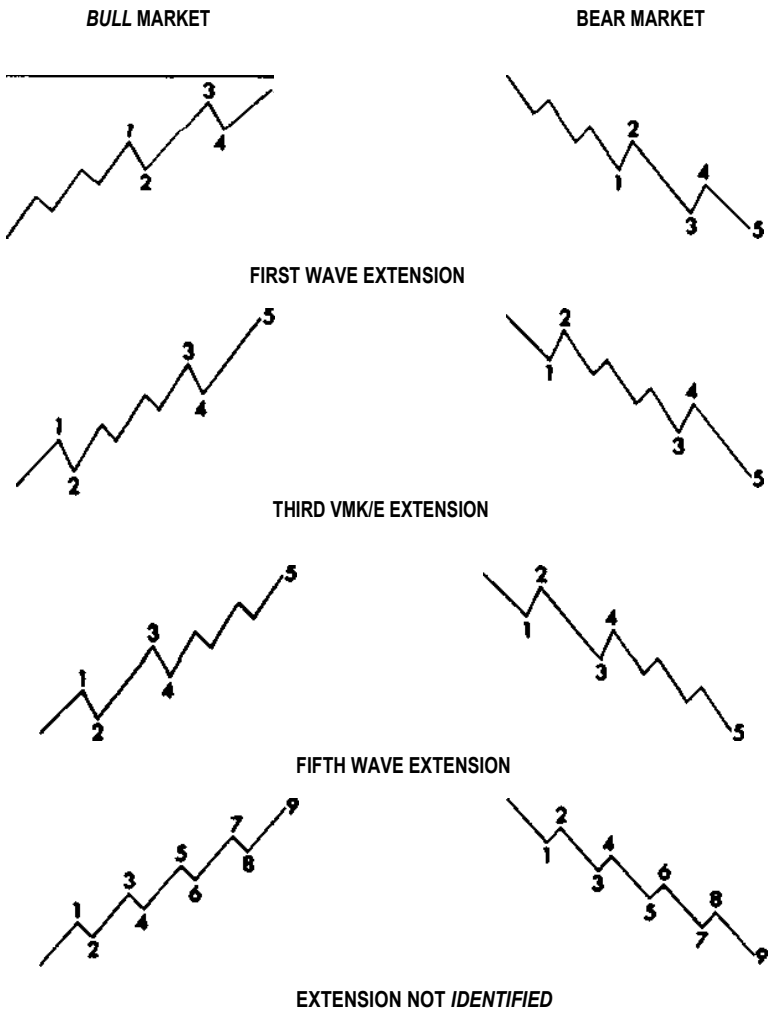

Figure 5.4. Diagrams of Elliott wave extensions.

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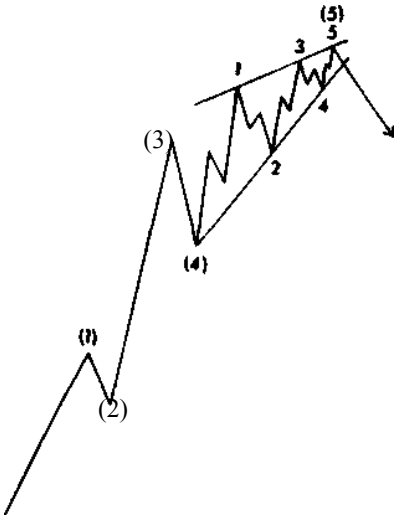

Figure 5.5. Diagram of a bullish pattern.

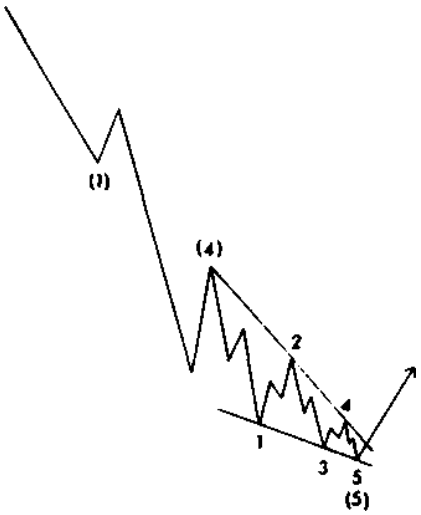

Figure 5.6. Diagram of a bearish diagonal triangle.

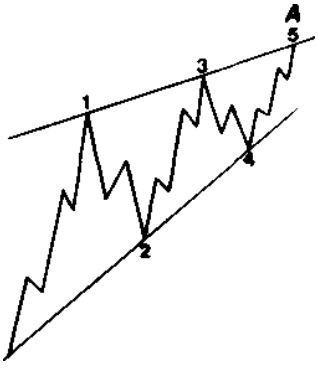

Figure 5.7. Diagram of a bullish diagonal triangle.

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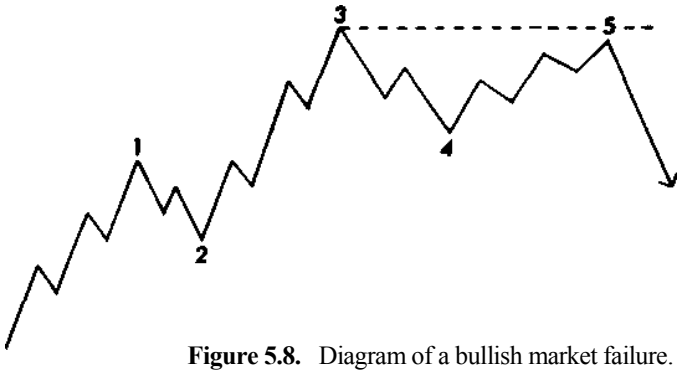

Figure 5.8. Diagram of a bullish market failure.

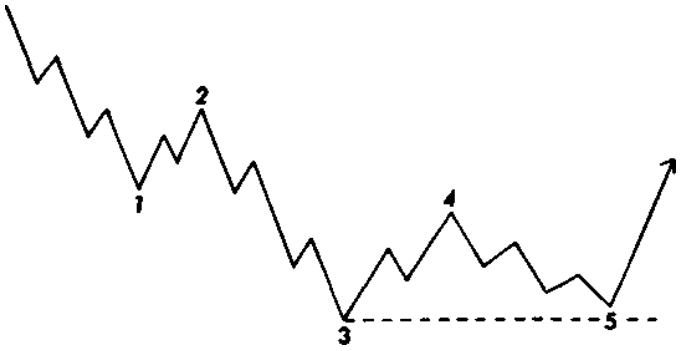

Figure 5.9. Diagram of a bearish market failure.

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